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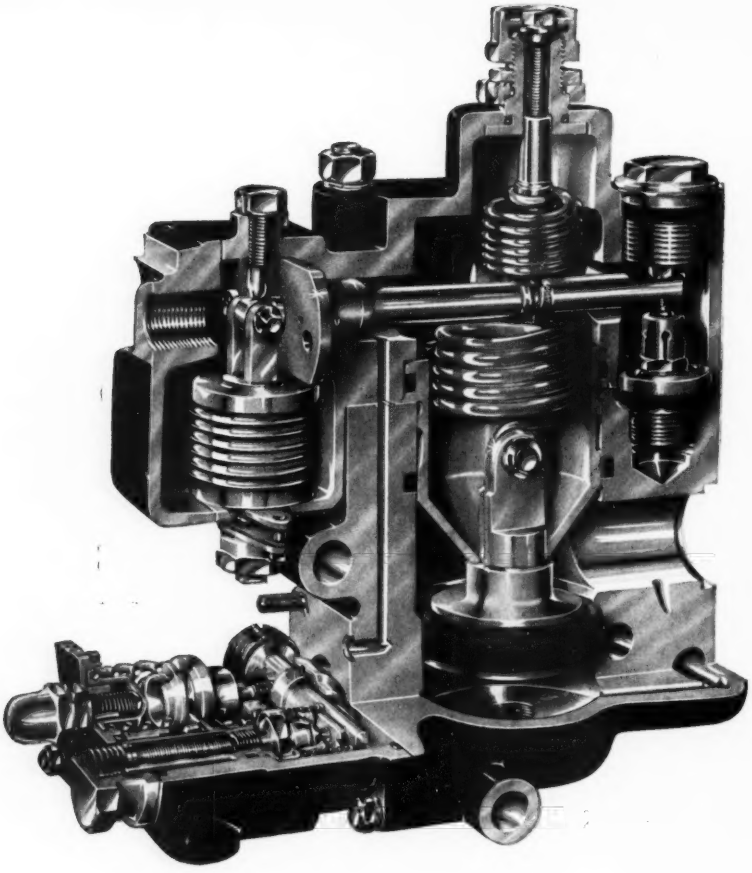

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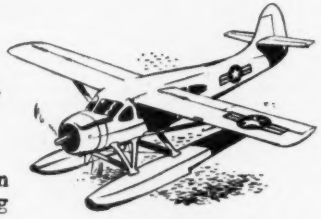
UNITED AIRGRAM

UNITED AIRCRAFT EXPORT CORPORATION

WASP ENGINES TO POWER CANADIAN KING BEAVER — The Pratt & Whitney R-1340 Wasp has been selected for the King Beaver, newer and larger version of the Beaver, bush aircraft of de Havilland Aircraft of Canada, Ltd. With this engine the 58-foot span monoplane will easily carry over a ton of cargo or 14 passengers — about double the capacity of the original model. The King Beaver, recently selected as a liaison aircraft by the U.S. Air Force, will be built at the Toronto plant of de Havilland.



Meanwhile, Canadian Pratt & Whitney Aircraft Co., Ltd. of Canada, will tool up a new plant for the manufacture of R-1340 Wasp engines at Longueuil, Quebec.

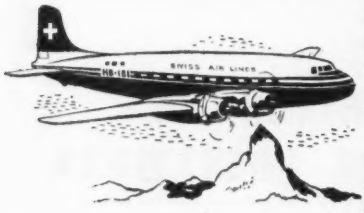
This Canadian subsidiary of United Aircraft Corporation has not been producing engines but has been overhauling Pratt & Whitney engines since its founding in 1929. During World War II the company manufactured Hamilton Standard-designed propellers.

KOREAN AIRLIFT HIGHER IN DAILY AIR MILES THAN BERLIN LIFT — The trans-Pacific airlift in support of the Korean campaign has been bigger than the Berlin airlift of 1948-49 in terms of daily miles flown, recent figures show.

From the outset, Pratt & Whitney engines have powered almost 100 per cent of the airplanes of the Korean lift, just as they did in Germany. Figures show that the Military Air Transport Service aircraft have been moving 5,000 troops and 1700 tons of cargo monthly from the West Coast of the U.S. to the Orient. Sick and wounded men have been flown back to the U.S. hospitals on return trips.

Workhorses of this giant lift have been four-engine Douglas C-54 Skymasters, equipped with Pratt & Whitney R-2000 Twin Wasps and Hamilton Standard propellers, and Boeing C-97 Stratofreighters, powered by R-4360 Wasp Majors using Hamilton Standard propellers. Outstanding performance of engines and propellers has contributed greatly to the success of this phenomenal operation.

FIRST DOUGLAS DC-6B CROSSES ATLANTIC TO ENTER SWISSAIR SERVICE —Early last July the first DC-6B, bigger version of the DC-6, was ferried overseas to Zurich, Switzerland to be studied by personnel of Swissair. A second DC-6B was delivered shortly afterwards and a third will be completed in mid-1952. DC-6B service by Swissair between New York and Zurich began August 19.



Like the earlier DC-6, also designed by Douglas Aircraft, the DC-6B is powered by four Pratt & Whitney R-2800 Double Wasp Engines. It is equipped with Hamilton Standard propellers. About 200 DC-6s are in service around the world, and more than 100 DC-6Bs are currently on order.

SIKORSKY S-51s EVACUATE 140 FLOOD VICTIMS IN ARGENTINA — Sikorsky S-51 helicopters were in the news again recently when they were used to rescue 140 people trapped by a flood of the raging Parana River, in the Santa Fe Province, north of Buenos Aires.

Two S-51 helicopters were flown to the distress area and removed the 140 flood victims despite very unfavorable weather conditions.

Fifteen helicopters manufactured by Sikorsky Aircraft in 1947 and 1948 were delivered to Argentina on the order of the Ministry of Agriculture of the Argentine Government.

IGOR SIKORSKY AWARDED THE GUGGENHEIM MEDAL FOR 1951 — The Daniel Guggenheim Medal and certificate for 1951 for notable achievement in the advancement of aeronautics has been awarded to Igor Sikorsky, Engineering Manager of the Sikorsky Aircraft Division, United Aircraft Corporation, Bridgeport, Connecticut.

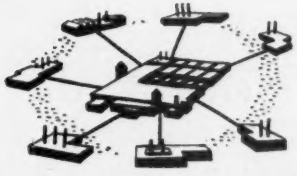
The Medal Board of Award said Sikorsky was selected for his "lifetime of outstanding contributions to aeronautics, including pioneering with multi-engined airplanes, flying boats, amphibians and helicopters."

HAMILTON STANDARD DEVICE CONTROLS FUEL FLOW IN JET ENGINES — A device described as the most sensitive yet created for controlling the fuel flow into big jet engines was announced recently by the Hamilton Standard Division. The fuel control has already passed endurance tests on Pratt & Whitney Aircraft's big J-57 engine.

The control combines an electronic "brain" with hydro-mechanical "brawn." It not only relieves the pilot of many specialized duties, but accurately governs the speed of the turbine wheel to a close tolerance. The electronic unit senses engine speed and temperatures of air entering the engine and leaving the tailpipe. Any tendency by the engine to exceed its design speed and temperature is controlled by signals to the hydraulic unit to slow fuel flow into the combustion chamber.

The hydraulic unit also measures air pressure into the engine compressor section and establishes a limit to the fuel flow at a level needed to maintain operation during landings and other operations not requiring maximum power. The electronic unit is built in an airtight magnesium casting. An important safety feature is the fact that there are duplicate vacuum tubes to take over for any tube that fails.

UNITED AIRCRAFT SUBCONTRACTING REACHES HUGE PROPORTIONS — Pratt & Whitney Aircraft since its founding in 1925 has followed a basic policy of subcontracting at least 50 per cent of the building of its engines. From an original list of 200, it now has a total of 5,285 subcontractors. Ninety per cent are classed as small businesses with less than 500 employees each.



In 1951 the engine building division of United Aircraft alone will pay out $250 million to subcontractors and suppliers, and about the same percentage of the contract dollar will be paid out by the other three divisions to outside firms. Altogether, the four divisions have more than 10,000 subcontractors and suppliers in nearly all states of the Union — with about half in New England.

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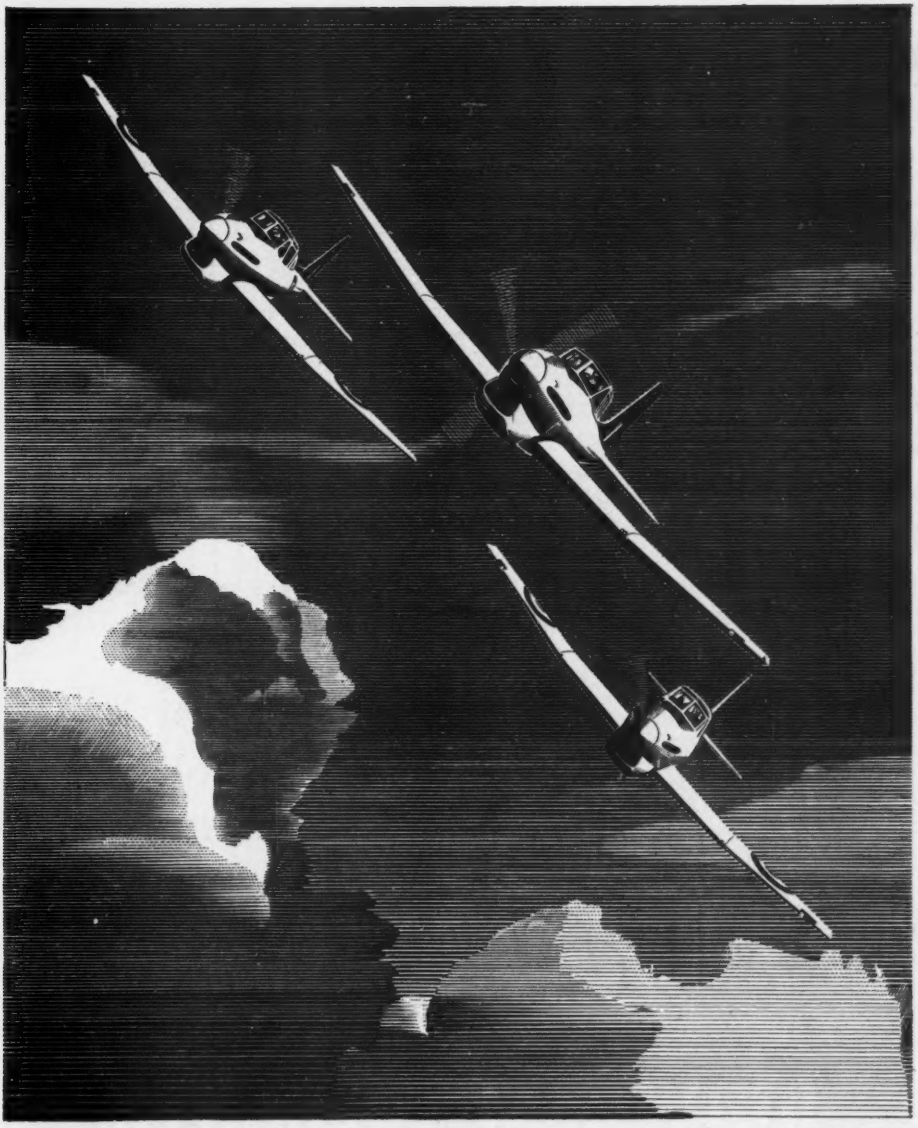

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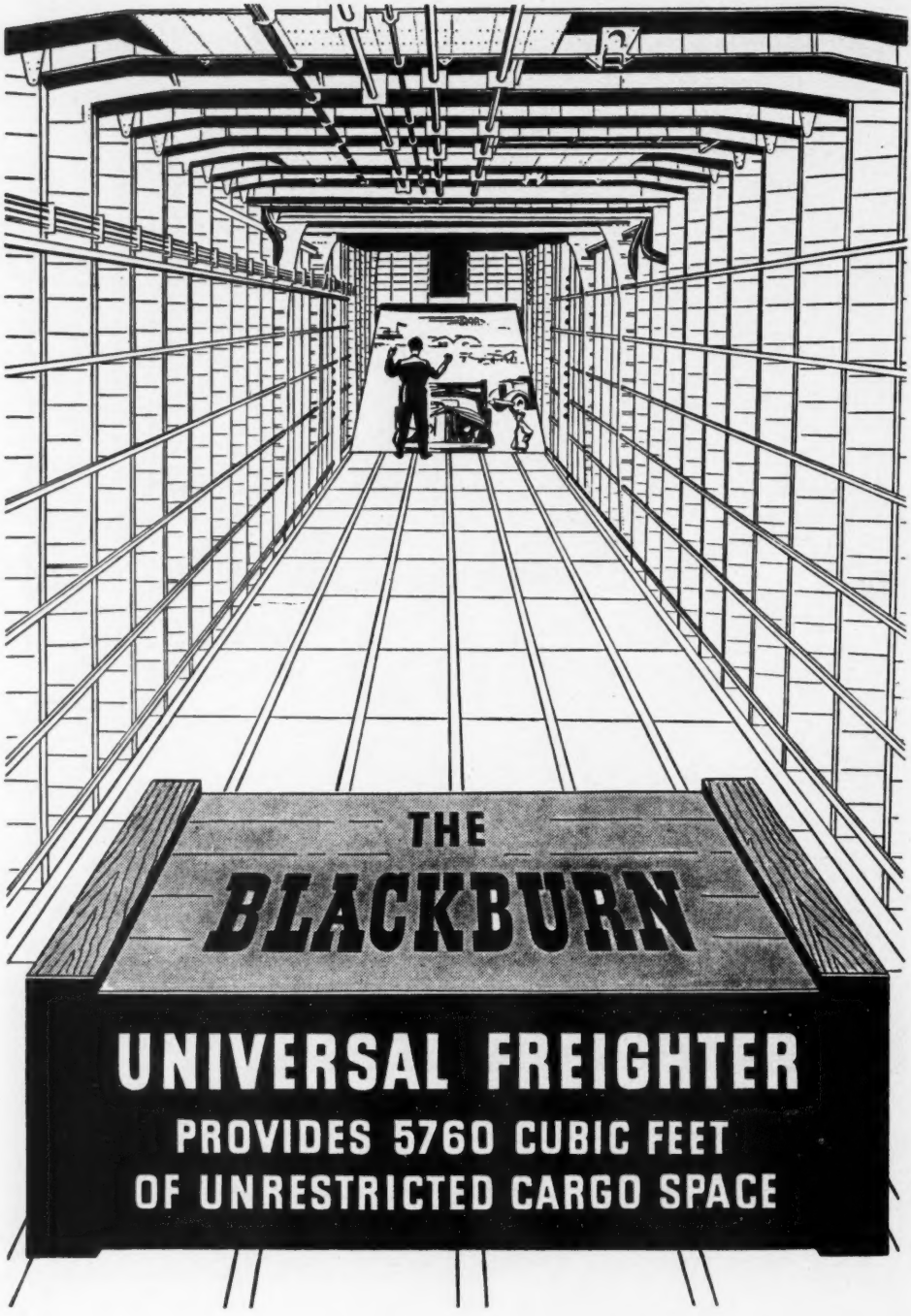
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Founded 1909

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Careers for Pilots

PILOTLESS aircraft excepted, there are two basic requirements for flying: the machine and the man to operate it. So preoccupied have we been of late with ever more complex aeroplanes, and with the methods of producing and operating them to the best advantage, that we have tended to overlook this matter of pilots. Compared with the situation a year or two ago, the recruitment of Service pilots is good. The standard demanded is high but is largely being met, though there still remains much to be done in the way of explaining to young men, while they are still at their schools and universities, the opportunities offered by the R.A.F. and Naval Aviation.

It is in civil aviation that the more acute problems now exist. The lack of pilots to meet the needs of the commercial operators is being viewed with some alarm, while an even more depressing situation concerns the opportunities (or lack of them) which confront the would-be private pilot.

So far as commercial flying is concerned, it seems that plans are now being worked out—advantageous to the military authorities, airline operators and candidates alike—whereby an "all-through" flying career may be offered to young men of seventeen to eighteen with superior qualifications. They would enter the R.A.F. on leaving school or college, train as aircrew, and serve for a period of years when they would be most receptive and of the most value in the operational squadrons. While still in the Services they would be given training designed to fit them for a follow-on career in commercial aviation. Thus, on completion of a period of military duty, similar to that undertaken for a short-service commission, they would be released with a gratuity in the normal manner; but instead of being jobless they would at once transfer to, for example, one of the Airways Corporations, and there be enabled to use their past experience to the best advantage. Their knowledge of all pertaining to flying would be excellent, their age—in the late twenties—just right for the responsibilities of, say, an airline first officer, and their future career assured up to a reasonable retiring age when their years of both Service and civil flying would qualify them for a pension.

A Place for the Amateur

So much for what appears to be an excellent and workable programme. But what of the private pilot to whom we have referred?

In any national emergency, and in his ability to provide a foundation and background to all professional flying, the amateur enthusiast is essential and invaluable. It would be a sad day for this country if the continuing rise in costs and increase in regulations and restrictions were to drive the private pilot out of the skies. New controls and licence requirements are introduced, in all good faith, to make flying safer; but they also make the amateur's task more difficult and—even more important—more costly.

If, in an endeavour to cure some epidemic, an island were to be denuded of its insect life, the balance of nature might well be upset and every other form of life adversely affected. It would not be drawing an exaggerated comparison to say that exterminating the "aviation bug" from a nation's life—which, in effect, is what would happen if private-flying enthusiasts, who do so much to maintain air-mindedness, were discouraged out of existence—could in the long run have a similar disastrous effect upon this island's economy and safety.

There are those who, with good reason, fear the possibility of such elimination. Safety and orderly regulation of air traffic we must have, but not a cure that is worse than the original ailment. The potential value to the nation of a healthy private-flying movement has, of course, long been recognized—though seldom officially acknowledged. A start has, admittedly, been made in giving limited financial assistance by such methods as relief from the fuel tax; but by far the most pressing need is what might be termed "organized encouragement" for the willing thousands of Britain's younger generation to learn to fly. We should remember that the pilots of the little aeroplanes may yet be asked to contribute even more to the safety of the nation than did the men with the little ships at Dunkirk.

COUNTER THRUST

A Close-support Exercise in Germany: Impressions from a Personal Visit

"FLIGHT" PHOTOGRAPHS

General Eisenhower, Air Vice-Marshal Sir Harry Broadhurst and General Sir John Harding evidently found something to amuse them as well as interest them at Celle. British Vampires and Danish Meteors were operating side by side at this station.

THE aims of Exercise Counter Thrust were very clearly defined: first, to exercise an Army Corps in mobile operations on wide fronts, against superior enemy land and air forces; second, to practise the technique of Army/Air co-operation and, in particular, the correct use of air reconnaissance. These aims were achieved by grouping the major part of the Air Force with numerically smaller ground forces, and vice versa.

For ten days—from September 14th-23rd—the British Army of the Rhine and the 2nd Tactical Air Force operated alongside, or in opposition to, Belgian, Dutch, Norwegian, Danish and American formations. The two opposing countries were Blueland and Redland, lying to the south and north respectively of the frontier represented by the Oldenburg-Bremen-Hamburg railway line. Redland (as might be supposed) was the aggressor and Blueland fought stubbornly to resist violation of her highly industrialized interior.

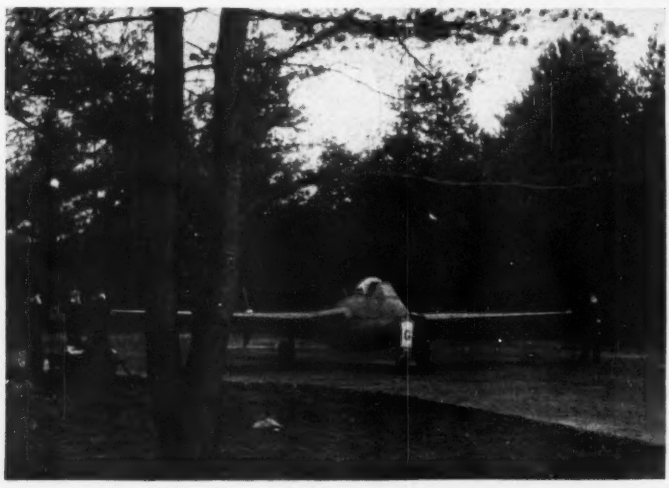
The precise pattern of the exercise, and a detailed description of its unfolding, is not our concern: it will suffice to explain that a rapid advance-to-contact by Blueland forces was followed by a fighting withdrawal. A defensive battle was then fought, against a "set-piece" Redland attack, and reorganization and exploitation brought the exercise to a close.

Direction was the joint responsibility of General Sir John Harding, Commander-in-Chief, B.A.O.R., and Air Vice-Marshal Sir Harry Broadhurst, who is commanding 2nd T.A.F. until the arrival of Air Marshal Sir Robert Foster in October. Redland's fighter/ground-attack force was three squadrons of R.A.F. Vampire 5s and two Meteor 4 squadrons of the Royal Netherlands Air Force at Wunstorf; three R.A.F. Vampire 5 squadrons and one squadron of Danish Meteor 4s at Celle; and two R.A.F. Vampire 5 squadrons, one of Belgian Spitfire 14s, one of Norwegian Vampire 52s, and one of U.S.A.F. F-84Es at Fassberg. For reconnaissance she had one squadron of Meteor 9s and one of Meteor 10s, operating from Buckeburg. Blueland's fighter/ground-attack wing of three R.A.F. Vampire 5 squadrons was stationed at Gutersloh. Both sides had extensive "fantasian" forces: Blueland, for instance, could call on 20 squadrons of Liquidator bombers and the same number of Zlik IX fighter squadrons!

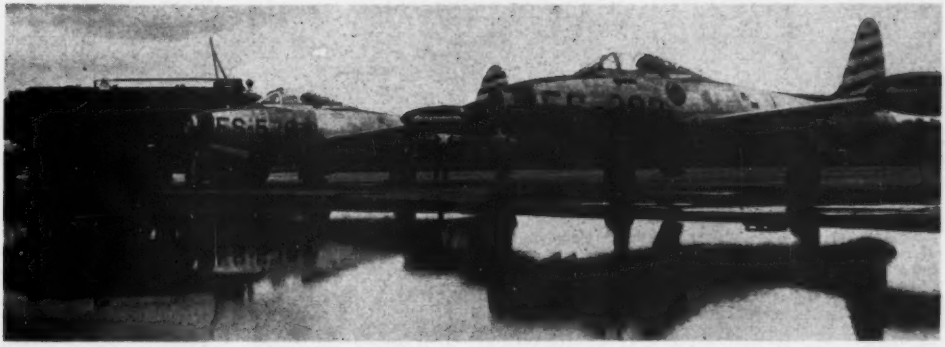
On the matter of realism, Sir Harry Broadhurst had something to say at the outset. Air superiority, he recalled, was regarded by the R.A.F. as a prerequisite for successful close-support operations; but in order that both armies should have the benefit of air assistance, it had been assumed that both had, in fact, achieved this superiority. As there was no opposition in the air, only a small part of the 2nd T.A.F. control system was functioning and, furthermore, the airfields in use were permanent ones, some of them in "enemy" territory. In fact, from the R.A.F. standpoint, Counter Thrust was solely a close-support exercise.

The C.-in-C., B.A.O.R., was warm in his thanks to 2nd T.A.F., which would, he said, participate in Counter Thrust 100 per cent, until the final phase, in spite of the fact that this left very little time indeed to prepare for Cirrus. "We in the Army," he added, "are very grateful indeed to them for what they are doing in that respect. It is typical of the magnificent spirit of comradeship and co-operation between the two Services that exists here in Germany, which will certainly be a battle-winning factor if, unhappily, we are attacked." The truth of General Harding's words was to become clearly apparent to us on many occasions as the exercise developed.

Our own first-hand impressions date from September 18th, when we landed at Celle in an Anson of the ever-helpful Communications Squadron at Buckeburg. It seemed that we were immediately in luck, for among the silver R.A.F. Vampires and green-and-grey Danish Meteors we saw *Columbine*, General Eisenhower's YC-121-A (Constellation). The General had been lunching at Fassberg and we watched him arrive in an R.A.F. Devon. He was quickly on his way round the various dispersal points, chatting in his robust, cheery manner with officers and men, eyeing work-detail boards and rockets (Smoke, No. 1, Mk 1) lying nose to tail by the Vampires. Spotting some Danish armourers busy at their bench he opened a discussion on a 20 mm cannon shell, asking its weight, and being given the information, we believe, in English. He was attended by General Harding, A.V-M. Broadhurst, A. Cdre. H. D. McGregor, A.O.C. No. 2 Group, and G/C. Roger Porteus. Beneath the wing of *Columbine* he spoke to us. "These are fine days for me," he said, "meeting old friends and visiting



A Norwegian Vampire 52 taxies out of its well-concealed dispersal bay at Fassberg for a strike against Blueland positions. At Fassberg there were British, Norwegian, Belgian and American squadrons.



Republic F-84E Thunderjets of the U.S.A.F. refuelling from an R.A.F. 100-octane petrol bowser at Fassberg.

units I served with." Especially, he praised the spirit of the men, the N.C.O.s and the junior officers. "These," he told us, "you must get round and talk with; not an old soldier like myself." And so *Columbine* took him down to Orly.

Next morning we paid a call on Army/Air Control H.Q. in Hanover, where the Chief Controller (Maj-Gen. P. N. White), Army Controller (Brigadier L. G. Holmes), and Air Controller (A.V-M. L. F. Pendred) were installed. R.A.F. Control, we found, had a dual function : it had control not only of the air side of the exercise as a whole, but of the Wing of Vampires which formed Blueland's tactical air force. (These aircraft, incidentally, carried black under-wing markings.) Targets for the Vampires were either "dreamed up" or requested by the Blueland Army through the Air Support Signals Unit. When a target was accepted, Gutersloh was given preliminary warning by telephone, then a Form D (specifying the type of attack, etc.) was signalled. With ground targets relatively thin, Blueland's air force tended to be "choosey" in its operations. For instance, when a certain Allied formation requested an air attack on tanks concealed in a wood, the target was hardly considered worthwhile, though it was accepted as a friendly gesture. A second request, specifying a 3-in mortar position, was, however, politely declined, with the suggestion that the gunners might care to take it on !

Redland, as we have seen, was exercising a strong air force against the bulk of the ground forces. Every evening there was a conference, whereat the Group Commander would sit by the Brigadier and the Staff would discuss the day's operations. The Army having stated its intentions for the following day, the Air Force would say how best these could be furthered. Almost invariably, a reconnaissance at first light would be requested, and should the reconnoitring pilot spot anything worthwhile he was authorized to break radio silence. Blueland's camouflage, however (as we later saw for ourselves), was excellent and "Tac.R." pilots had the utmost difficulty in pinpointing targets in the heavily wooded country.

Bomber Command Link

What the exercise may have lacked in realism, it did not appear to lack in thoroughness. For instance, in order to practise the procedure for requesting and controlling strategical bomber support in tactical operations, Bomber Command had established a liaison team at the H.Q. of Redland's tactical group. It was also reassuring to find three R.A.F.V.R. officers on the Group Tactical Intelligence Staff.

Having looked briefly behind the scenes, we now went out front to watch the show, and we had not long to wait. As we made for Wunstorf, we saw Vampires plummeting down on targets in the roadside fields; vehicles concealed in the farmyards; tanks; and, at one point, evidence of their passage where the parapet of a bridge had been shaved off like a cheese-rind. Arriving at Wunstorf, we hid the Volkswagen beneath the pines by the mobile Ops. Room. At that very instant a section of Blueland Vampires screamed overhead, seeming to ruffle the topmost branches. Thunderflashes exploded around us and we began to feel a little sorry for ourselves—until we turned around to find Field Marshal Viscount Montgomery of Alamein regarding the scene with a twinkling eye.

On the vast hard-standing area (laid down for the Air Lift) we found a sight, the like of which—happily—is becoming increasingly common on the Continent : a "four-star" C-54 of the U.S.A.F.; a French N.C.702; a Norwegian Dakota; Dutch Meteor 4s; British Vampires, Ansons and Oxfords; and an interesting pair of American liaison aircraft in the form of a Stinson L-5 and a Ryan L-17B. Within a short time Lt. Gen. Øen, C.-in-C. of the Royal Norwegian Air Force and Air Chief Marshal Sir Ralph Cochrane, our own V.C.A.S., had both arrived.

At Wunstorf, as we had already heard, the Redland squadrons were being briefed at dispersal and the first briefing we attended was followed with more than usual interest, as we ourselves were to take part in the ensuing strike. The situation was outlined by an Army Major : Blueland still held a salient to the north-east of the Steinhuder Meer and at 1500 hr our Redland army was to go in for the assault with the object of straightening the line. Two sections, each of four Vampires, would make R.P. attacks on nine targets, including a dug-in H.Q. and gun pits, around the little town of Neustadt, on the River Weise. Our own Meteor 7, flown by F/O. Rigby, was to accompany the second section on this important softening-up operation.

We Strike in a Meteor

Airborne, we joined up with the Vampires and from 2,000ft watched them drive in steeply on their first run; then it was time to get down to business ourselves. The first object of our attention was a tank, skulking beneath the trees to the east of Neustadt bridge (though of this fact—our R/T being unserviceable—we were unaware at the time). We were, however, afforded several other opportunities to spot a variety of inviting targets, as again and again the Meteor bored in, at indicated speeds of up to 420 kt. We glimpsed the Bofors traversing with us, saw troops in the streets and in the nearby fields, and, as the Derwents thrust us up and away in high-g climbing turns, felt our oxygen mask being dragged from our face. Again and again, with and without the benefit of dive-brakes, we lined up on the Belgian defenders, saw bright-red roof-tops and sombre woods rush past a few feet beneath our stubby wings and the sky reeling as we broke away; but, notwithstanding the abundance, and discomforting proximity, of the targets attacked, we must confess that at the subsequent debriefing we should have rendered a halting account of our observations .

Our hypothetical rockets and cannon shells being expended, we tucked ourselves in with the returning formation (wherein, it seemed, our pilot was bent on toasting the meteor's nose at a Goblin tail-pipe), peeled off, and landed. The Vampire pilots seemed well content and their claims included gun pits, H.Q. tents, tanks, soft-skinned vehicles and troops. With the addition of our own bag—a tank, lorries and straw-camouflaged tents—the score must have stood high. But next day the salient still obtruded.

At Buckeburg we saw the fighter/reconnaissance Meteor 9s and high-altitude-reconnaissance Meteor 10s which had made such a vital contribution to the exercise. Though the weather had prevented photography from the extreme heights at which the Mk 10s are designed to operate, these unarmed, long-span, single-seaters had been active at medium and low levels. We saw some first-rate photographs secured by both marks and were assured that the clarity of these was due in a large measure to the Meteor's vibration-free power plant.

The "Tac.R." (or fighter-reconnaissance) F.R.9s normally operate in pairs (one acting as watchdog for the other) whereas "P.R." Meteors, in their primary role, fly alone.

Our last visit was to Fassberg, where we found a cheerful bunch of British, Norwegian, Belgian and American pilots grouped around W/C. "Johnny" Johnson. British Vampire

(*Concluded at foot of page* 412)

FROM ALL QUARTERS

Live Testing for Ejector Seats

EVER since Mr. P. B. Lucas, M.P., questioned the Minister of Supply in the House of Commons on the subject of ejector seat efficiency, following on the death of Trevor Wade (who was killed last April when flying a Hawker P.1081), there has been a good deal of weighing of pros and cons of ejector-seat design. Not only the intrinsic design of types and makes of seat have been studied, but the whole subject of their installation in the aircraft, and of pilot's equipment, ejection drill and so forth, has come under review.

Now comes the news of an official decision that, before an ejector seat will be accepted as an approved item of Service equipment, live testing, as opposed to testing only with a dummy body, will be carried out—probably by the Royal Aircraft Establishment.

This move by the Ministry of Supply is a sound one. No one will envy the "guinea pigs"; but, if their task results—as it must—in proving the efficiency of seat design, then whatever the personal risk involved it is worth while, if only on the cold-blooded basis of evaluating risk to one or two lives instead of to scores or even hundreds.

In the Martin-Baker seat, this country unquestionably has an exceptionally efficient pilot-safety device—if the Russians have a better ejector seat, we do not know of it and, anyway, it is a matter only of academic interest. But brilliant an engineer as James Martin is, even his ingenuity is not capable of doing the impossible. What it amounts to in essence is that, if an ejector seat has to perform a given duty, there are certain essential pre-requisites that, in the present state of knowledge, cannot be met in any other form. Such issues decide, for example, the size and weight of seat, and the clearance minima.

Some existing types of aircraft are capable of being equipped with ejector seats, others are not; but this has no bearing on the tenet that every future Service aircraft except, perhaps, primary trainers, heavy transports and helicopters, should be fitted with such means of escape. This naturally means that the aircraft have to be designed from the very first for the inclusion of ejector seats: a policy which, if we may make the observation, has long been overdue.

A Chance to Repay

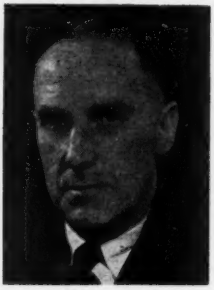
"OUR debt is now not only to the Few. As the Royal Air Force grew larger and larger and the hard years of war unrolled, many thousands of their comrades died so that our Island might live, free and inviolate. By 1945, alas—as our casualty lists told the tale—the Few had become the Many. Had it not been for those young men whose daring and devotion cast a glittering shield between us and our foe, we should none of us be sitting at rest in our homes this Sunday evening, as members of an unconquered—and, as we believe, unconquerable—nation. Let us all welcome this chance to pay a small measure of the debt we owe to the paladins of the Royal Air Force"—Mr. Winston Churchill, in his recent broadcast appeal for the R.A.F. Benevolent Fund.

TAKEN OVER: Camouflaged, and bearing the insignia of the Royal Ethiopian Air Force, the Fireflies make an impressive line-up at Ringway (see "*Ethiopia's First Fighters*," opposite).

W. F. Shaylor's New Post

FROM the de Havilland Enterprise comes news that Mr. W. F. Shaylor has been appointed commercial manager of the de Havilland Engine Co., Ltd., as from September 1st, in which post he is responsible to Mr. H. Buckingham, business director. His office is at the Stonegrove factory, Edgware, Middlesex. Until the recent merging of Airspeed, Ltd., with the parent de Havilland Co., Mr. Shaylor was business manager of Airspeed for 14 years, latterly as a director. Previously he had long experience in aviation, mainly in Canada and Great Britain. He served in the First World War as a fighter pilot and did a great deal of flying, particularly in Canada, before entering upon the executive side of aircraft operation and later of the manufacturing industry.

Mr. W. F. Shaylor.



Mr. N. Rowbotham.

Bristol Engine Chief Steps Down

THE directors of the Bristol Aeroplane Co., Ltd., have regretfully announced that Mr. Norman Rowbotham, C.B.E., Wh.Ex., F.R.Ae.S., M.I.A.E., M.I.P.E., has been obliged, through reasons of health, to relinquish his appointment as divisional managing director of the company's engine division. He will, however, remain a director.

Mr. Rowbotham assumed his present post in 1944. He is also a director of Rotol, Ltd., and a director of the French repair organization, S.E.C.A., in which Bristol hold a number of shares.

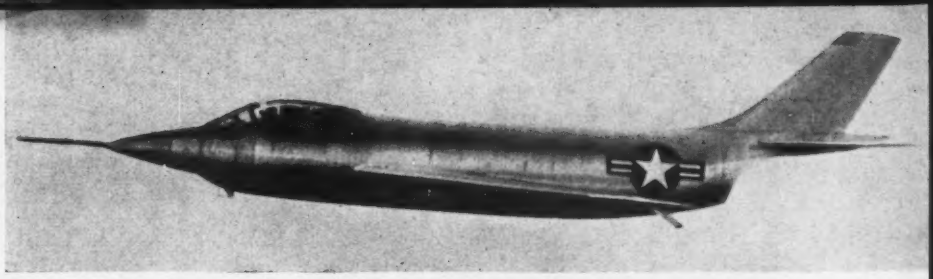
Born in Manchester in 1892, he served his apprenticeship in the locomotive shops of the Great Central Railway. In 1915, he joined the Aeronautical Inspection Directorate and in 1922 he went to the Gnôme et Le Rhône Company in Paris to supervise the manufacture, under licence, of Bristol Jupiter engines. As more and more countries acquired licences to manufacture the Jupiter—by early 1930 it was in production in 16 overseas countries—he travelled all over the world to ensure that the standard of quality remained uniformly high wherever the engine was produced.

Mr. Rowbotham returned to Bristol in 1931 and was then responsible for all engine production at the company's works. During the war, he was in charge of all Bristol engine production at Patchway, in the Hawthorn and Accrington plants, and in the "shadow" factories.

COUNTER THRUST **(Continued from page 411)**

pilots expressed their envy of the higher-powered Norwegian Mk 52s, and the Belgians in turn felt a little aggrieved that they should still be flying Spitfires (though they are soon to receive F-84s). But the spirit of comradeship, tempered with good-humoured rivalry, had to be experienced to be believed. Immediately the allied squadrons arrived, W/C. Johnson told us, their aircraft were refuelled, their pilots were briefed, and they were away on their first strike with no fuss or bother of any kind.

The Wing Commander's observations on various aspects of the exercise were specially interesting in view of his Korean experience. Never, he said, had he seen such skilful camouflage as Blueland's. He considered the exercise in general to be a highly realistic one, except that much of the flying was at levels where severe light-flak opposition could be expected in war. With his own and Norwegian pilots he had operated at night with fair success, which he attributed in some degree to the troops' seemingly incurable habit of "brewing-up" for tea regardless of consequences. Of this habit Field Marshal Sir William Slim, C.I.G.S., had something to say at the close of the exercise. Any improvement in that direction alone will make Counter Thrust worth-while. H.F.K.



DEMON: The U.S. Navy has a predilection for aircraft names formerly used by the Hawker company. Already it has a Fury and now — depicted here—the McDonnell Demon, or XF3M-1.

Ethiopia's First Fighters

ANOTHER chapter in the history of the Fairey Firefly opened on September 20th, when the first of a substantial number of Firefly Mk Is ordered by the Ethiopian Government was formally accepted at Ringway Airport by Lt.-Col. Asefa, Chief Liaison Officer of the Imperial Ethiopian Air Force.

Resplendent in desert camouflage—dark earth and mid-stone upper surfaces and sky undersurface—the initial batch of five aircraft, lined up with their pilots in front of the Fairey hangars, comprised four reconnaissance-fighters and one operational trainer. Each bore, in addition to green, yellow and red national markings on wings and fuselage, a large black serial number on its fin, successively from 601 to 605.

These Fireflies, like the ones being supplied to Thailand, are completely reconditioned Mk I aircraft of the type used with great success by the Royal Navy against ground targets in Korea. All, including the trainer, are equipped to carry rockets and bombs, but are at present fitted with 90-gallon long-range tanks for delivery by air to Ethiopia *via* Ringway, Lyons, Nice, Tunis, Tripoli, Benghazi, El Adem, Cairo, Wadi Halfa, Khartoum and Bishoftu. Leader of the ferry flight, which should be nearing completion by the time this is printed, is Major F. Lönnberg, one of the I.E.A.F.'s Swedish instructors; other machines in the formation are piloted by Lt. Col. Asefa and 2nd Lts. Joseph, Negash and Abera.

A further batch of Fireflies will be delivered to Ethiopia next month; others will follow as and when they can be released from service with the Royal Navy and reconditioned. They will be based at the training station of Bishoftu, which is 30 miles south of Addis Ababa and under the command of Col. the Count von Rosen—one of the most colourful characters in present-day aviation, whose achievements include flying for the Red Cross during the Italo-Ethiopian War of 1935-36 and a remarkable non-stop 3,865-mile flight in a Saab Safir from Stockholm to Addis Ababa in 1947.

The Fireflies will equip the I.E.A.F.'s first fighter squadrons, supplementing the Saab 17 single-engined attack bombers and Saab Safir and Cessna UC-78 trainers at present in service.

The Fairey Aviation Company, incidentally, has presented an unusual trophy for the most outstanding feat of flying by pilots, crews or squadrons of the I.E.A.F. It is a silver model of the traditional Ethiopian lion—"the Lion of Judah"—holding the Christian Cross. The design was approved by the Emperor.

Helicopter Assault

ALMOST from the start of the Korean war, the use of helicopters for rescue, communication and supply services has been an accepted procedure; but not until last week—to be precise, on Thursday, September 20th—did rotary-wing aircraft assume an assault troop-carrying rôle.

On this day twelve Sikorsky helicopters—presumably S-55s—transported a company of infantry, with ammunition and rations, to a strategic position on a mountainside. The whole operation, which would have occupied two days by marching, was completed in four hours without incident. The landings were made within range of the Communist lines, but for some reason the enemy offered no opposition. One helicopter even laid a telephone line over the tree-tops to the new position.

The success of the operation suggests that it may be the first of many others in circumstances where interception by enemy fighters or light A.A. fire seems reasonably unlikely.

THE UNITED NATIONS MEDAL, which will be awarded to personnel serving with the U.N. land, sea and air forces in Korea. The obverse bears the U.N. emblem and the reverse the inscription: "For Service in Defence of the Principles of the Charter of the United Nations." The ribbon is blue and white.

Mr. JAMES HAMILTON

BY the death, on September 15th, of James Hamilton, Handley Page, Ltd. (whose works director he was) have lost an executive who made an outstanding technical contribution to the firm's success as efficient producers of large aircraft. Mr. Hamilton, who was 62 years of age, was a Scot who had been educated at Queen's Park Academy, Glasgow, and the West of Scotland Technical College. Until he joined the Cricklewood company 22 years ago, he had been with William Beardmore and Co., Ltd., of Dalmuir, the engineers and shipbuilders who, in the 1920's, developed a number of aircraft diesel engines and also built several large all-metal aircraft. Mr. Hamilton was manager of their aircraft development until it was closed down in 1928.

Mr. Hamilton.

His most valuable contribution to Handley Page progress was undoubtedly associated with the application of the "split construction and unit assembly" production method by which, beginning with the Harrow in 1935, all the famous large H.P. aircraft have been built. Intended to make the most economical use of jig capacity, the system involves the division of the airframe structure into units which can be built as almost fully equipped and finished sub-assemblies outside the main assembly jigs. Needless to say, the method (which was described in detail before the R.Ae.S. in November, 1948, in a paper by Mr. D. C. Robinson, M.B.E., works superintendent) proved of immense value in war production of the Hampden and Halifax.

Mr. Hamilton had outstanding organizing ability; he could not only quickly identify the true cause of a production problem, but could at once suggest the most practical solution. Of a modest and unassuming nature, he was popular with his colleagues of all ranks, and he had the workers' welfare always at heart. His industrial experience was at the disposal of the Engineering and Allied Employers' Federation, of whose management board he was a member.

One of the characteristics which made him popular with H.P. employees was his lively interest in professional football; in his earlier years he had played for Scottish Queen's Park, Clyde Athletic, and Third Lanark, and had appeared in cup finals and international matches. He was also a keen golfer.

Mr. Hamilton—who had been unwell for some months, but had attended his office whenever he could manage it—leaves a widow and a son, to whom all knew him will extend sympathy.

Prizes at Wolverhampton

THE Wolverhampton Aero Club were fortunate in securing good weather and excellent support for their recent private "At Home". During the day several trophies were competed for, and the inter-club relay race was won by the Wolverhampton Club, the Air Schools Trophy being presented by Mrs. Harben. The Chairman's Cup, which is awarded for general efficiency to a pilot who has been taught to fly by the Club and has under 70 hours to his credit, was won by Mr. John Hall, and the *Express and Star* Navigation Trophy was carried off by Dr. L. W. Hamp. The H. M. Dobson, Ltd., Cup was won by Mr. D. J. Jemmett, and Mr. L. E. T. Barley was the recipient of the F. B. Webster Cup.

HIS MAJESTY THE KING: In publishing this photograph—one of the last taken before the King returned from Balmoral to undergo his operation last Sunday—"Flight" expresses the earnest hope, which every reader will share, that His Majesty will be speedily returned to health. Older readers will recall that our Sovereign, who is a Marshal of the Royal Air Force, gained his "wings" in the Service shortly after the First World War. In later years he has made frequent use of air travel, and the aircraft of the King's Flight have been fully occupied during the past few weeks in carrying His Majesty and members of his family between Balmoral and London. The above happy photograph was taken when the party of cadets from the Air Cadet League of Canada, now in this country, visited Balmoral; standing next to the Duke of Edinburgh is Mr. Doland R. Maclaren, D.S.O., M.C., D.F.C., who is in command of the party.

HERE AND THERE

Air Marshal in a Delta

AT Boscombe Down last Friday, the Avro 707A was flown by Air Marshal Sir John N. Boothman, C.B., D.F.C., A.F.C., Controller of Supplies (Air), Ministry of Supply. He is reported as being so satisfied with its handling characteristics that he immediately gave orders that 25 selected pilots should be cleared for flying it. The Air Marshal, who is now 50 years of age, was a Schneider Trophy pilot.

B-29s from Korea

THE 22nd Bombardment Wing of the U.S.A.F. has returned for its third period of training in England before going home to the United States in December. Equipped with B-29s, the Wing was one of the first units of the Strategic Air Command to see service in Korea. During its stay here it will be stationed at Sculthorpe, Lakenheath and Wyton.

Piston-Engine Rejuvenator?

AN improved sparking-plug has been developed by the Bowing Airplane Company which, they claim, delays the formation of carbon, improves starting and acceleration, and permits slower and smoother idling—all with no increase in fuel consumption. These improvements have been brought about by the inclusion of what is termed a "pre-combustion chamber" within the structure of the plug. Both car and aircraft models are being developed, and it is stated that, in the latter, resistance to fouling by leaded fuels will be an outstanding advantage.

Helicopter Gathering

THE next meeting of the Helicopter Association is on Saturday, October 6th, when there will be an all-day discussion (R.Ae.S. Library, 10.30 a.m.) on *Design and Construction of Rotor Blades*. Non-members are admitted to these lectures by ticket obtainable (free) from the Helicopter Association, Londonderry House, London, W.1.

Safely Out

THE fact that Vampires are not fitted with ejector seats lends interest to the news that two pilots of these aircraft who collided at 25,000ft during exercises over Johore on September 19th escaped safely by parachute and returned unhurt to Singapore. They were practising dummy attacks with Hornets at the time, and when they baled out the Hornet pilots followed them down; the Hornets then called-up two Sunderlands, which were able to collect the parachutists—F/O. W. G. Hester and Sgt. Plt. G. E. Buckle—after they had walked to the nearby coast.

Please Keep Clear

IN *Information Circular No.* 119/51 the Ministry of Civil Aviation asks pilots to avoid flying in the vicinity of the Severn Wildfowl Trust between the end of September and the beginning of April each year. "Wildfowl will be arriving at the reserve during the next six weeks," says the *Circular*. The area covers a radius of four miles from 51° 44′ 30″ N, 02° 25′ 00″ W.

Diversion

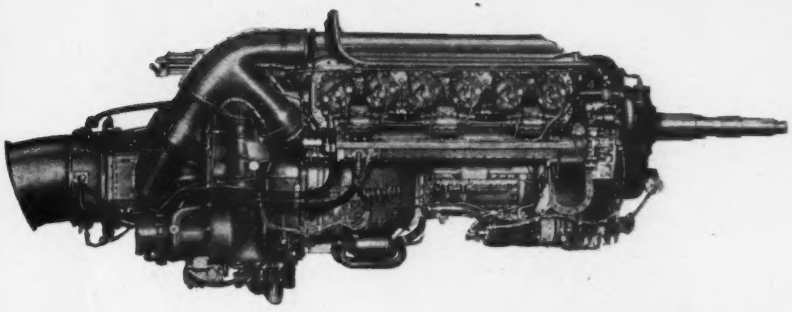
WE feel that the following, from "Peterborough's" column in *The Daily Telegraph*, well deserves repetition: "A Richmond resident who has written to London Airport, complaining of the noise of airliners, is quoted as stating: 'Every evening an airliner flies in my front door and out of the back door. I am seriously considering putting a partition between the doors to stop the nuisance.'

"I understand that an official at London Airport is writing to the complainant asking him if his neighbour's house is similar in design. If this is so, the offending airliner will be re-routed next door."

Aerostatics

ON September 17th Mr. G. E. Long, of the R.A.F. Balloon Centre at Cardington, made a second free-balloon ascent from London's South Bank Exhibition. Carrying as passengers Sir Gerald Barry, the Festival director-general, and Mrs. R. A.

NAPIER



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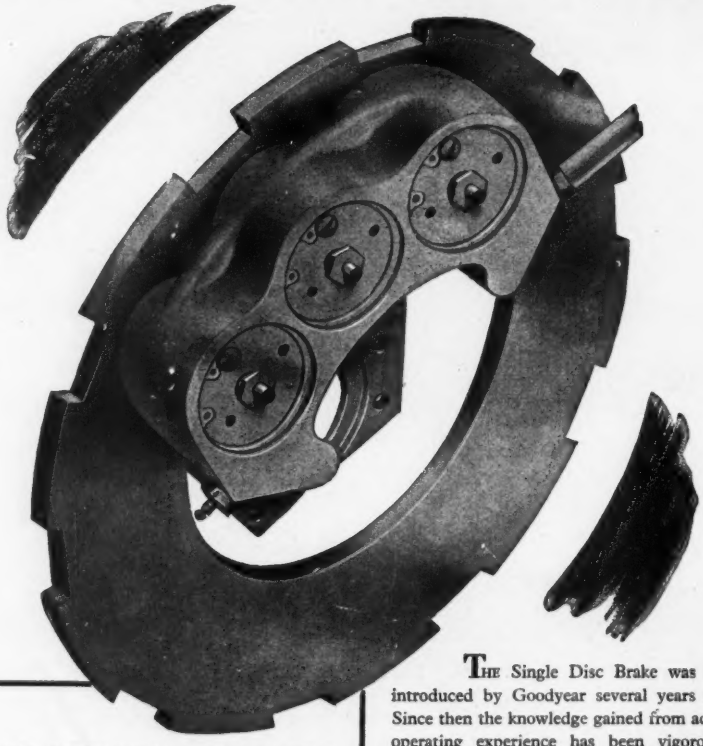

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THE Single Disc Brake was first introduced by Goodyear several years ago. Since then the knowledge gained from actual operating experience has been vigorously applied, and to-day the Goodyear Single Disc Brakes have a reliability unique in their field. They give the pilot real confidence in landing, and sensitive control in every ground manœuvre.

Here again, Goodyear Research and Enterprise are far in the lead.

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★ UTMOST RELIABILITY ★

HERE AND THERE...

McMurtie, wife of Cardington's C.O., he made a 1 hr 37 min flight to Old Bexley, Kent. A photograph of the 28,000 cu ft balloon, taken during the previous South Bank ascent, appeared in *Flight* of September 21st.

Expensive Engine-Starting

A PILOT at Rearsby, whose aircraft "escaped" from him after he had swung the airscrew, and flew itself round the district for two hours before crashing, was fined £5 at Melton Mowbray last week for "operating an aircraft in a negligent manner so as to endanger life or property."

R.Ae.S. President's Recovery

MAJOR F. B. HALFORD, president of the Royal Aeronautical Society, postponed an operation on his throat in order to be able to preside at the R.Ae.S.-I.Ae.S. Conference. He has since undergone the operation, it was successful, and he was able to leave the nursing home on September 18th, from which date a fortnight's convalescence was foreseen.

SITTING OUT: During the Farnborough Show the sales and export committee of the S.B.A.C. were entertained at a picnic lunch by their chairman, Mr. F. E. N. St. Barbe of de Havillands. Names reading from top to bottom, and from left to right, are:—

M. N. Golovine (Armstrong Siddeley), H. W. Goodinge (S.B.A.C. exhibition secretary), R. T. Hughes (S.B.A.C. secretary), S. Smith (Guest, Keen and Nettlefold), J. J. Parkes (Alvis), H. Buckingham (de Havilland Engines), R. Nicoll (Handley Page), C. S. Thom (de Havilland Aircraft), C. Emery (Armstrong Whitworth), R. V. Perfect (Saunders-Roe), E. C. Bowyer (S.B.A.C. Director), B. W. A. Dickson (Vickers-Armstrongs), F.E.N. St. Barbe (de Havilland).

The Huge Hughes

RE-LAUNCHING of the 200-ton Howard Hughes flying-boat, originally stipulated for September 1st by the U.S. Reconstruction Finance Corporation, may be delayed for another three months by the necessity for modifications in the installation of the eight 3,000 h.p. Pratt and Whitney R-4360 engines. Originally designed in 1942, the enormous aircraft made a brief trial flight in 1947, and has since been under further structural development in its hangar at Long Beach, California.

IN BRIEF

LISTING 1,700 British Standards current at December 31st last, and with a supplement of those issued up to March 31st, the *British Standards Year Book*, 1951, has now been published by the British Standards Institution (24 Victoria Street, London, S.W.) at 7s. 6d post free.

* * *

John Laing and Son, Ltd., structural engineers, have issued an impressive publication to celebrate their growth over 100 years. Schemes with which they have been associated include Filton's 1¾-mile runway and 54 war-time airfields.

* * *

The Pulsometer Engineering Co., Ltd., announce the appointment, as directors, of Sir Felix Pole (who will take the chair at board meetings in place of Mr. Eliot Hodgkin, who has resigned), Mr. R. G. W. Bliss, and Mr. A. V. Price. Mr. J. Elliott is secretary.

* * *

Centrifuges, ranging from laboratory-bench types to models used on engine test-beds for separating impurities from oil, are illustrated in a new catalogue from Sharples Centrifuges, Ltd., Woodchester, Stroud, Glos.

* * *

Montrose Caravan Distributors, Ltd., inform us that the caravan which was taken to Farnborough in the hold of the G.A.L.60 Universal Freighter was one of the Willerby models for which they are concessionaires. An illustration of this unusual transport operation appeared in *Flight* of September 14th.

* * *

On his retirement (announced recently in our columns) from the post of technical director of Short Bros. and Harland, Ltd., Mr. C. P. T. Lipscomb was presented with a Westminster-chime clock as a token of esteem from his colleagues.

* * *

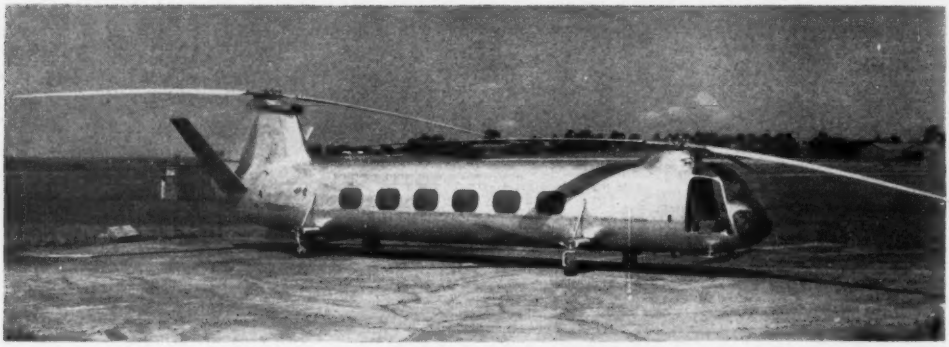
Avica Equipment, Ltd., are now in their new office and factory building at 1 Adams Place, Georges Road, Holloway, London, N.7 (North 4281). Production at the new premises is covered by temporary A.I.D. and A.R.B. approval. The firm's export company, Worldmarket, Ltd., will continue to operate from 50 Pall Mall.

NAVAL POWER: On September 14th, the Hon. John F. Floberg, Assistant Secretary of the U.S. Naval Air Force, visited the Armstrong Siddeley works and airfield with a party of senior officers. He is seen in this picture fifth from the left. Fourth from the left is Mr. H. T. Chapman, C.B.E., M.I.Mech.E., F.R.Ae.S., Armstrong Siddeley managing director: also in the picture, first on left, is Mr. W. F. Saxton, M.B.E., technical and works director. Mr. Lindsey, M.A., F.R.Ae.S., chief engineer, is last but one on the right, next to Mr. Thomas, M.B.E., chief designer. The aircraft is the Fairey Gannet (Armstrong Siddeley Double Mamba).

"FLIGHT" PHOTOGRAPHS

READERS interested in obtaining original prints of *Flight* photographs taken at Farnborough, and of other pictures by our photographic staff, are reminded that these are available from *Flight* Photographic Department, Dorset House, Stamford Street, London, S.E.1, in a variety of sizes. New prices for typical sizes are: 6in by 4in, 2s. 6d. (sepia, 4s.); 8in by 6in, 3s. 6d. (5s. 6d.); 10in by 8in, 5s. (7s. 10d.); 12in by 10in, 6s. (9s. 8d.); 15in by 12in, 9s. 6d. (13s.); 20in by 16in, 13s. (18s.); hand-coloured 20in by 16in, £3 13s. 6d. Postcards of a large variety of aircraft of the R.F.C., R.A.F., R.N.A.S., and Naval Aviation are also in stock, at 8d. each, post free (12 or more cards, 7½d. each).

Flight photographs reproduced in our pages may be identified as such by the indication given in the inscription or in the heading of the article.



BRISTOL 173

First Photographs of the Twin-rotor Helicopter: Ground-running Tests

WHEN, earlier this year (March 16th), we gave a detailed analysis of the twin-engined twin-rotor Bristol 173 helicopter, we expressed the view that the design formula was unquestionably a right one, but that it was not necessarily the only right one. Since that article was published, the 173 has been undergoing ground-running trials, not without tribulations—but then, tribulations go hand-in-hand with trials.

If the full flight test programme proceeds smoothly it is to be hoped that the time will not be too far distant when the 173 will appear in B.E.A. colours. The aircraft in its present guise is not really big enough to meet the Corporation's current ideas about helicopter operations; there is, however, an old adage about birds and hands and bushes and it may well be that, when B.E.A. have a few 173s to operate, the aircraft will be found doing a useful job of work. The Corporation is, at any rate, likely to obtain experience with the 173 appreciably before it makes the acquaintance of the larger types which may follow.

In the "straight" helicopter, overwhelmingly the greatest number of safety eggs reposes in the rotor basket—and an exceedingly complicated and critical basket it is; so attention is being directed with increasing emphasis toward the compromise convertible-type in which the characteristics of the fixed-wing and rotary-wing configurations are blended. As we implied in a leading article a fortnight ago, there is a great deal to be said for such a compromise, particularly for commercial aircraft; but whether the arguments hold good with quite the same force for military applications is questionable. The cardinal virtues of the helicopter are its ability to land and take-off vertically and to hover. These are qualities which have a special value in the military scheme of things, perhaps a greater value than in the commercial sphere. It is, therefore, likely that even if the fixed-wing-cum-rotary-wing aircraft should win the commercial day, the orthodox helicopter is at least assured of a future as a military type.

In the heading picture, the simple elegance of the 12-seat Mk 173 is shown to advantage, whilst, below, with the 48½ ft counter-rotating rotors spinning smoothly, the aircraft stands tethered by safety ropes to large blocks of concrete. Ground-running trials are now going well and it is therefore only naturally to be expected that flight trials will not be much longer delayed.

Power for French-built Jets

A BRIEF review of French Vampire, Mistral and Venom production appeared in *Flight* of August 10th last and, although the details were clearly stated, questions have since arisen as to the types of turbojets and intakes employed. In answer to our request for confirmation of facts we have received a letter from the Société Nationale de Constructions Aéronautiques du Sud Est in which it is stated: "In particular there is no question at all in your article about the mounting of the de Havilland Ghost in the Mistral. On the contrary, it is made clear that the French Vampire 5 is equipped with a Goblin, the Vampire Mk 53 Mistral with a Nene, and that the Venom will be equipped with a Ghost, and we assure you that it is by reason of the thinness of the Venom wing that it would have been impossible to employ the same type of air entry as on the Mistral, had it been desired to fit Nenes in the Venoms."

Lockheed Aircraft Developments

A REPORT to Lockheed Aircraft shareholders by the president, Mr. Robert E. Gross, sums up the highlights of the company's current aircraft-production activities in the following terms :—

"Production progressing of F-94B and F-94C jet fighters; tooling started for F-94D; T-33 and TO-2 jet trainer output rising to highest level for any aircraft since World War II; T-33 manufacture by Canada licensed; large quantities of P2V patrol bombers being built for U.S. Navy, Great Britain and Australia; commercial and military Super Constellation production assured through 1953; preparations progressing for B-47 jet bomber manufacture at federally owned facility at Marietta, Ga.; three new models, including first turboprop all-cargo transport XC-130 for Air Force, under development."

STRUCTURAL ADVANCES

A Pioneer's Plea for the Pioneering Spirit: Professor Hill's Anglo-U.S. Conference Lecture

Harald Penrose flying the Westland-Hill Pterodactyl Mk 5 of 1934. *Designed by Professor Hill, it was powered by an R-R Goshawk engine.*

ON Tuesday morning, September 4th, the serious business of the Third Anglo-American Conference (see *Flight*, September 7th and 14th) got under way with the first lecture of the session, presented before a large audience in the Corn Exchange at Brighton. The paper—titled *Advances in Aircraft Structural Design*—was read by the author, Professor G. T. R. Hill, M.C., M.Sc., F.R.Ae.S., in typically humour-framed but forthright fashion. The free-thinking which conceived the Pterodactyl so many years ago is still very much in evidence in the lecturer's character and, moreover, is rendered the more potent by the bite which etches the point of his humour.

Having introduced his lecture with an apposite survey of early structural methods, Professor Hill then went on to consider the current problems of producing satisfactory skins and stated that the smoothness requirements for laminar flow are, on the face of them, almost impossible of achievement. On a small scale, a suitable surface had been produced, but only as a result of many weeks of hard work on a few square feet. It might well be that the efforts to mechanize what had been successful in the coachbuilder's art for a hundred years or more would prove to be more profitable than to try to build a structure a hundred feet or so long to an accuracy of one or two thousandths of an inch in contour. It was the lecturer's opinion that the dividends in speed and range for getting a really smooth surface were greater than any other gains which the structural engineer had in sight.

The lecturer wondered whether the metal skin would be successfully challenged by plastics in the foreseeable future. Plastics reinforced by certain fibres could produce structures of remarkable strength, but it might well be that stiffness would be the stumbling block; smoothness of finish and cheapness in mass-production were there almost for the asking, and the possibility of putting in the reinforcement as was done in ferro-concrete opened up very attractive possibilities. However, the advantages of plastic construction would not be fully realized unless the (aircraft) designer started from the beginning and encouraged the exploitation of the many advantages that plastics could offer.

Turning to a consideration of aeroelasticity, Professor Hill suggested its common manifestations in flight could be conveniently divided into non-oscillatory and oscillatory types. He cited the example of progressive loss of aileron control with increasing flight speed, and also elastic distortion provided by divergence, each of these examples being of non-oscillatory character. Aeroelastic phenomena of oscillatory type were essentially flutter cases, and the mathematical theory of flutter had been set firmly on its feet in Great Britain by the classic investigations of Frazer and Duncan, published in 1928. One feature of prime importance to the structural engineer was the stiffness, and particularly the torsional stiffness, of the structure. With the advent of speeds of flight near or even surpassing the sonic speed, the provision of adequate wing stiffness often involved appreciable increases in structural weight. Whilst up to a few years ago, the provision of adequate strength had been the primary consideration in determining the scantlings of the main components of the aircraft, the considerations of stiffness were today beginning to override those of strength.

Swept-back wings had accentuated the oscillatory difficulties; whereas with the straight wing, bending and twisting could be controlled separately, with a swept wing the effects were much more complicated in that both bending and twisting each produced changes of incidence. A great deal of study at the present time was being devoted to the exact modes of distortion of swept-back wings under lift loads. The first thing to do was to establish convenient axes of reference for specifying distortions with the maximum of convenience. Without getting so deeply involved as was inevitable with a delta wing, it was for many purposes convenient on an ordinary swept-back wing to consider the half-wing only, and to choose an axis running from some arbitrary point at the wing root to another arbitrary point at the wing tip, and to call this the "length" of the wing.

As often happened, nature in some way appeared to be against man in the swept-back wing. Such a wing experienced an increase of incidence when it encountered an up-gust. Upward deflection of the wing tips as compared with the wing root would produce a loss of incidence at the tip, with the resulting nose-up moment on the whole aircraft. This nose-up moment rotated the aircraft to yet higher incidence; in other words, a condition tending toward instability was experienced. It was also clear that the whole effect was proportional to the wing flexibility in bending, and thus a new factor was introduced as compared with the straight wing.

This tendency to loss of longitudinal stability might be expressed in terms of a forward movement of the aerodynamic centre, and when it was remembered that this forward movement was dependent upon wing flexibility and that, for a given stress, flexibility was largely determined by wing thickness, it was clear how difficult the structural design of swept-back wings was rapidly becoming. High speed appeared to demand small wing thickness and high sweep-back; the maintenance of longitudinal stability called for high thickness and small sweep-back.

On the subject of "new shapes," the lecturer recalled that, when in 1936, Busemann pointed to the value of sweep-back for delaying compressibility effects, hardly a tremor appeared in the crystal ball in which designers were reputed to gaze for inspiration. Now, the design of high-speed aircraft had changed and was changing so rapidly that a layman had to be told which part of the aircraft was the front end. By the time the second world war was over, it was found that the ideas of such men as Lippisch, in Germany, had brought on to the drawing board what was now called the delta design, where the very heavy sweep of the leading edge was associated with little or no sweep of the trailing edge. In some ways, such a design eased the task of the structural engineer who would, perhaps, regard as ideal square or circular plan-forms with reasonable depth in the centre. The delta wing certainly had a smaller span than was usual; it might be more correct to say that it had a smaller aspect ratio and thus, in general, less bending moment. In addition, with the same thickness/chord ratio, the absolute depth in which the main spars were housed was greater since the root chord was large; not only this, but questions of torsional stiffness were eased by the area toward the wing root of what, with a slight straining of language, might be called the torsion box.

In the past there had been some confusion between structural twist and incidence change which, for straight wings, were identical. Professor Hill then referred to what he called an "aero-isoclinic" wing, i.e., one which had the same angle of incidence under aerodynamic loading. He went on to say that, if such a wing could be designed, and the flutter problem could be solved, it might be possible to avoid the increase in torsional stiffness and in structure weight that was usually demanded by sweep-back.

In various countries, designers had been pondering on how to escape from all the drawbacks which, in our present state of knowledge, seemed to be characteristic of the delta and delta-like shapes. One possible solution, the lecturer suggested, would be to hinge each wing about a vertical axis, so that in the landing configuration, the wings were projected more or less at right angles to the plane of symmetry, and in the high-speed configuration, they were swept back to give the delta shape. If this were done, it would appear that the designer would have left behind many formidable aerodynamic problems only to find himself facing a series of almost equally formidable structural problems. Professor Hill's own preliminary examination of the matter inclined him to

STRUCTURAL ADVANCES . . .

the view that, on the whole, there would be a net gain worth securing. It seemed that, apart from complication, the penalty in actual structure weight was likely to be quite small.

Many years ago, the lecturer had some experience of sweep-back variable in flight with the Pterodactyl Mk VI. The range of sweep-back was much less than would be needed in the application at present considered, but in spite of the usual spate of pessimistic forecasts, the variable sweep had been delightfully easy to operate in flight, and the structure weight penalty was only two per cent of the all-up weight. On the modern version of this, where large angles of sweep would be needed, great ingenuity would undoubtedly be called for in making good the cracks and gaps near the hinge, but the whole philosophy of a change in geometry to deal with the immense speed range foreseen for this kind of aircraft was in line with what had been done with success in the past, as could be seen from looking at modern designs of the high-lift flap, retractable undercarriage and variable-pitch airscrew. Although the gain in wing drag due to sweep-back was less at the higher supersonic speeds, it was still there, and the possibility of swinging the wings forward to the straight position for landing ensured a larger span in that condition when compared with alternatives, such as, for example, a thin rectangular fixed wing of low aspect ratio.

In conclusion, Professor Hill made a strong plea for every encouragement to be given to those who were ready to break with tradition and carry us to new heights of achievement. Progress came in two ways. By steady, methodical development, and by gigantic bursts when a new idea was born, at first laughed at and then taken seriously, finally to sweep the board. Many people, the more timid souls, liked to think that progress came only from steady development; they were uncomfortable and anxious when they contemplated the possibility of launching out on relatively uncharted seas. The Wright Brothers fought valiantly against this attitude of mind and conquered. The present was a time of ferment, of galloping progress in the world; Dr. Roxbee Cox had said "we must have ideas, develop them and use them. Too often we seem to have had ideas and forgotten them until others have developed them." Professor Hill commented on how truly Dr. Roxbee Cox had spoken, and how dimly was any change in attitude to be seen in Great Britain.

TURBINE-BLADE PRODUCTION

Avro Canada Special-Purpose Machine-Tool Cuts Time on Orenda Blade-Machining

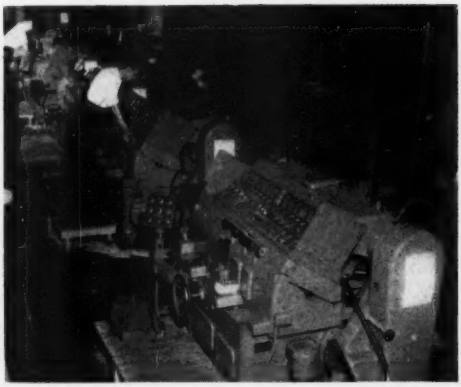
IT is generally conceded that one of the biggest problems in the large-scale output of aircraft gas turbines of the axial-flow type is the production of the vast number of compressor and turbine blades involved. As we remarked in an article last year ("Two-edged Blades," November 16th), a typical axial-flow unit may require some 2,400 blades; and on a war-production scale this might mean that well over five million blades a month would be needed.

In efforts to solve this difficulty a number of special-purpose production machines have been designed, on both sides of the Atlantic, and are now in regular use by gas-turbine manufacturers. In most cases the principle of translating the contours of a master pattern into cutting-tool movements is employed, and a new machine evolved by A. V. Roe, Canada, Ltd., and Modern Tool Works, Ltd., is of this type. Designed some time ago (a description appeared in our associated journal, *Aircraft Production*, last January), it has now been in service, in considerable numbers, for a sufficiently long period to satisfy its sponsors as to its fitness for the job.

Known as the 14-spindle duplicator, the machine transfers the master contour to 14 work-pieces simultaneously, an hydraulic system being used to translate the motion. The spindle-head (the primary moving part) carrying the tracer stylus and 14 spindles having cutters of the end-mill type, pivots on bearings under the impulse of a hydraulic cylinder. The spindles themselves are driven from a common shaft by 90-deg skew bevel gears.

The master blade and blade blanks are held by a fixture on the work-table (the secondary moving part) which moves on precision bearings under the spindle head. As the head pivots downwards towards the work, the stylus engages the master blade; and while the head continues its arc of travel the work-table is actuated to and from the end mills under the control of the hydraulic tracer, thus generating the desired form.

After each cutting stroke the spindle head raises clear of the work and the table automatically indexes longitudinally at a pre-selected feed rate in readiness for the next cutting stroke. An electro-hydraulic control system makes the complete machining cycle automatic. The accuracy and fine surface finish which, it is stated, are produced by this machine, reduces further finishing operations to a minimum.



Fourteen-spindle duplicators in service at the Avro Canada factory.

From the operational experience gained to date on these duplicators, say Avro Canada, it is apparent that their use has cut the time required for the manufacture of each blade by approximately 75 per cent. It is expected, also, that an improved type of cutter will reduce the number of machining cuts required, thereby further increasing the rate of production. Accuracy has not been sacrificed to achieve the improved production rates, for it is claimed that the blades produced compare very favourably with those made on other machines.

Manufacturers interested may obtain further details from Avro Canada, of Malton, Ontario, or from Canadian Patents and Development, Ltd., of Ottawa, to whom the patent rights have been assigned.

FORTHCOMING EVENTS

Oct.	4.	R.Ae.S.: Seventh British Commonwealth and Empire Lecture, "Air Transport in New Zealand and the South Pacific," by A.V-M. Sir L. M. Isitt, K.B.E., R.N.Z.A.F.
Oct.	6.	Helicopter Association: "Design and Construction of Rotor Blades" (all-day meeting).
Oct.	21-28.	Aero Club of Algeria: Tour of Algeria.
Oct.	24.	R.Ae.C.: Jubilee Ball.
Oct.	24.	Royal Air Force College, Cranwell: Rugby v. Oxford University Greyhounds (away).
Oct.	30.	Society of Instrument Technology: "Materials for Instrument Manufacture," by E. B. Moss.
Oct.	31.	Royal Air Force College, Cranwell: Boxing v. Oxford University (away).
Nov.	3.	Royal Air Force College, Cranwell: Fencing v. Cambridge University (home).
Nov.	14.	Royal Air Force College, Cranwell: Rugby v. R.A.F. XV (home).
Nov.	23.	Helicopter Association: "The Giant Helicopter," by O. L. L. Fitzwilliams, B.A.
Nov.	24.	Society of Licensed Aircraft Engineers: Main Lecture: "Functioning of a Manufacturer's Servicing School," by D. W. Richardson, M.B.E., A.F.R.Ae.S.
Nov.	27.	Society of Instrument Technology: "Visual Presentation," by K. F. H. Murrell, M.A., F.R.P.S.
Dec.	21.	Institute of Navigation: "Meteorology and Navigation," by Lt. Cdr. P. G. Satow, D.S.C., R.N.
Jan.	18.	Institute of Navigation: "Navigational Errors," by W/C. E. W. Anderson, O.B.E., D.F.C., A.F.C.
Jan.	29.	Society of Instrument Technology: "Mechanical Consideration in the Design of Servo Systems," by Prof. A. Tustin.
Feb.	15.	Institute of Navigation: "Navigation Aids for Military Aircraft," by S/L. D. Bower.
Feb.	23.	Society of Licensed Aircraft Engineers: Main Lecture: "Duties, Work and Functioning of the Air Registration Board," by R. E. Hardingham, O.B.E., F.R.Ae.S., M.S.L.A.E.

PIPELINE AIRLINE

Strange Country and Curious "Met" Await the Charter Pilot in the Iraq Oilfields

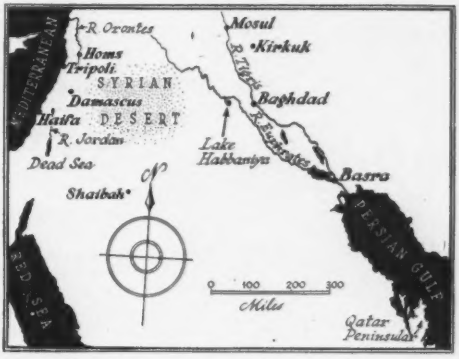
By CAPT. R. C. O. LOVELOCK, D.F.C.

THOUGH the scene of the flying activities which Captain Lovelock describes here from first-hand knowledge is Iraq and not Iran, the duties and conditions from the pilot's point of view are not dissimilar from those obtaining in the area which has lately figured so largely in the news. This article clearly shows how closely this region of the Middle East has been bound up with British Service and civil aviation during the past thirty years.

THE installations and activities of the Iraq Petroleum and associated companies, pioneers of the desert pipeline, are centred at Kirkuk in northern Iraq; they extend westwards to the Mediterranean, and south-eastwards to the limits of the Persian Gulf. Oil, the basic product, is disposed of by means of pipelines from the various fields to convenient ports in either of the two seas, but the greater part of the other internal communications, and also overseas communications, are maintained by air. On the internal routes, Doves have now replaced Rapides, whilst, for the services to the United Kingdom, home-based Vikings and Dakotas are chartered. From Kirkuk to the west, the Mediterranean pipelines cross the Tigris and Euphrates in parallel, then bifurcate towards Haifa and Tripolis across the Syrian desert; and it is at the pumping stations on these lines, each one of which is equipped with its own water-plant, radio station, telegraph, and air-conditioned domestic quarters, that landing strips are established, in addition to those at the oilfields themselves.

Geological factors have naturally had the greatest effect upon the ground communications of the oil industry in these parts, because pipelines have to be routed with as much attention to terrain as any other surface carrier; but aviation, with its eternal preoccupation with climate, is affected in addition by a factor which has influenced the course of Middle East history from earliest times. Near the coast of Syria-Palestine, the pipelines pass through the parallel mountain ranges which carry the basins of the Orontes and Jordan. These mountains create a fertile seaboard by trapping winter rains from the moist westerlies off the Mediterranean, but they also create a rain-shadow which causes an immediate hinterland of harsh desert extending to the very landward slopes of the inner range. Perhaps there is nowhere in the world where one may find such a ruthless division between the desert and the sown. Had the Crusaders, for instance, been able to capture Aleppo and Damascus at the limit of the fertile land, the advantage of a desert frontier would have obviated the need for those great fortresses—like Krak des Chevaliers in the Tripoli-Homs gap—which mount guard at every pass on the line of the Orontes-Jordan.

Since the time when political complications between Israel and the Arab League resulted in the closing of the whole Haifa sector with its enormous refinery, the Tripoli terminal has increased in importance, and soon, by means of additional piping, the northern lines will be able to absorb the whole of the former Haifa "throughput." The I.P.C.'s base airport, Tripoli (Kleiat), lies in the opening of the Tripoli-Homs gap at the northern extremity of the 10,000ft Lebanon range. This is one of the historical strategic passes through the coastal mountains, and in addition to providing egress to the coast for the road, rail, and pipeline, the gap is much used by aircraft of medium cruising altitudes when bound for Cyprus from Iraq. In the winter it is the scene of some of the worst weather in the Middle East. When he sang "Lo, the winter is past, the rain is over and gone" Solomon was voicing the enviable certainty of one who was living on this coast of predictable summers. The change of season arrives with a sudden onslaught of Nature, and at Tripoli, when the warm evenings and bright moonlight are heavy with the scent of orange blossom, one tends to forget the startling weather phenomena encountered when flying for I.P.C. in the winter, especially when westbound and requiring to land at Kleiat.



The "desert pipeline" territory, from Mediterranean to Persian Gulf.

Towards the north of the Levant coast, the strong winter depressions force their way through the mountains in order to traverse Mesopotamia, and even the Indus basin. In the heights of the Lebanon, such disturbances are compelled to let go great quantities of moisture which falls as heavy rain, hail, or snow. In the gap, wind-speeds up to 100 m.p.h. have been recorded, accompanied by very violent turbulence, while fearful blizzards scourge the summits of the range. Since

Early morning at Kleiat Airport, Tripoli: An Airwork Viking, on charter to the I.P.C., about to load passengers and freight for the Persian Gulf. In the distance is the end of the snow-capped Lebanon Range.

With an I.P.C. Dove alongside the new hangar at Kleiat: Capt. G. W. Harding, D.S.O., D.F.C., managing pilot of the company's Dove fleet, discusses a servicing matter.

PIPELINE AIRLINE . . .

Tripoli is a regular night-stop for the home-based charter crews, there are often opportunities, during these months, for them to hear the abnormal effect of spontaneous thunderclaps echoing from the mountain flanks—reverberations which put one in mind of certain passages from the Old Testament, and reveal the awful majesty of elemental forces . . . "Yea, the Lord breaketh the cedars of Lebanon."

In these extreme conditions of turbulence, precipitation, and static electricity, flying is impossible, but in simpler cases of low cloud there is a service of radio aids available whereby landings can be carried out at Kleiat even when approaching from the east.

Between the Euphrates crossing at Haditha, and that of the Orontes at Homs, there are four stations on the Tripoli pipeline. At the centre one, "T.3," near the Roman colonnades of Zenobia's Palmyra, and also at Homs and Kleiat, medium-frequency beacons have been set up. In bad weather, aircraft bound for Kleiat from the east can join the track of the pipeline by homing successively on to "T.3," Homs, and Nicosia, at a quadrantal height of 6,500ft; then, when Kleiat is abeam to port, they may descend safely over the sea, afterwards homing, under cloud, on the Kleiat field. Westbound to Kirkuk there is a beacon there ("K.1") and at Haditha ("K.3"). Although Kirkuk is 1,000ft above sea level, A.D.F. let-downs can be made there because the terrain nearby is fairly flat. A new and larger airfield is now being laid out at Kirkuk.

From Kirkuk, the chartered aircraft are required to fly down through Basra to Dukhan, a new producing field on the Qatar peninsula in the Persian Gulf, and beyond it to exploratory projects, where single "wildcat" wells are being drilled, in the Shaikhdom of Abu Dhabi. Mesopotamia, the land "between the rivers" is of particular interest to British aviation, not only because so many routes to the Far East pass through there, but because it was the scene of the first experiment in military air control, whereby, in the early twenties, the R.A.F. became solely responsible for maintaining the peace in Iraq and Transjordan—and incidentally acquired a magnificent training ground for itself because of the superb flying conditions which obtain there for the greater part of the year. Even if T. E. Lawrence had not enigmatically chosen to serve in the ranks of the R.A.F. himself (from 1922-35), the study of his life and work would always have exercised an appeal to the R.A.F. on account of his share in the advocation of air control, and because R.A.F. squadrons have always been based in Transjordan where so many incidents from the Arab Revolt took place. On the other hand, the "Mespot" stations—Mosul, Hinaidi, Shaibah, and Habbaniya—have left the mark of the desert on R.A.F. peacetime tradition in another way, through having immortalized the area in a lugubrious and profane ditty entitled "Shaibah Blues." British air influence quickly spread to the Persian Gulf, where staging posts for Imperial air routes were soon established on the Arabian side; many a young flying-boat man has subsequently been stirred to a lifelong interest in the Arabs by the opportunity of visiting a lagoon of such enchantment as Ras-al-Khaimah.

In this area, between the Mediterranean and the Arabian Sea, there is a further meteorological hazard in the *shamal* (Arabic, "north"), a wind which blows at over 30 kt and raises the dust sometimes to a height of 10,000ft, a condition which often persists for as much as two days after the wind has dropped. It is possible, during a *shamal*, for every airport to be QGO "from Damascus to Sharjah," an area covering more than a thousand miles of route. Ships in the Gulf also experience great difficulty from it, for, in addition to the reduced visibility for steaming, it is often impossible for them to come to moorings during the prevailing sea conditions. The Kuwait Oil Company used to import drinking water from Abadan in special tankers every day; after three days of *shamal* at Kuwait, the writer has known it to be necessary for the administration there to issue two quart bottles of beer per man in lieu of drinking water! On the ground at such times there is a stench of death in the air, for the Arab does not bury his dead animals and every city has a charnel dump outside its gates.

Where exploratory drilling is going on, a landing strip will usually be constructed at the "wildcat" stage, so that any gear for which drilling might be delayed can be flown in. Often no other equipment than a grader is available for making the landing strip, and after the surface has been scraped, the hard gypsum under the sand is rolled by all the heavy mechanical transport of the camp. There is usually a radio station on such locations, but always near the rig, and not necessarily at the landing strip; so, after homing so far in dusty conditions, the pilot must find strip visually from other local landmarks. Once an airfield has started producing, as Dukhan has, aviation facilities of a more permanent nature are soon provided; but it may be several years before all the domestic refinements are added, and the Gulf stations remain as pleasant in spirit as only pioneering projects can be. The ten-gallon hat and high-heeled boots of the Texan are familiar sights at such oilfields, where most of the drillers are still American.

The company's employees are all exceptionally air-minded, which makes the contract a pleasant one from the crew point of view. Moreover, every load of passengers contains experts in a wide choice of subjects; listening to their conversation, one may even learn of a kind of aerodynamics by which the likelihood of a desert port silting-up can be assessed from the shape of the sand dunes in relation to the prevailing wind several miles away. Amongst the other professionals there are geologists, hydraulic engineers, and political officers, to say nothing of the amateurs who have studied the archaeology and ancient history of the area, or perhaps the best way to produce flowers and vegetables out of the desert sand. The geologists, incidentally, with their permanent interest in outcrops, like nothing better than to be invited into the cockpit when crossing a mountain range.

BROADCAST GUIDE

THE sixth edition of *Guide to Broadcasting Stations** has recently been published by *Wireless World*. This 94-page booklet lists both geographically and in order of frequency long- and medium-wave European stations and short-wave stations of the world. Information is given concerning European television stations, Consol and standard frequency stations, and metre-wave European stations, and the contents also include wavelength and frequency conversion, formulae and tables.

* *Published by "Wireless World," Dorset House, Stamford Street, London, S.E. 1. Price 2s. (postage 2d).*

THREE ITEMS OF OUTSTANDING INTEREST

at the SBAC Farnborough air display

★ The SNARLER ROCKET MOTOR

The next logical step in jet aircraft propulsion—a liquid propellant rocket motor independent of atmospheric oxygen.

★ The record breaking SAPPHIRE METEOR

On August 31st a Gloster Meteor fitted with 2 Armstrong Siddeley Sapphire turbojets established 4 new time-to-altitude records.
(Subject to official confirmation)

★ The SAPPHIRE CANBERRA

Sapphire turbojets built under licence in America by the Wright Aeronautical Corporation will be fitted to American Canberras.

ARMSTRONG SIDDELEY MOTORS LTD

COVENTRY

Members of the Hawker Siddeley Group.

In commercial service
from up-country charter to world trunk routes

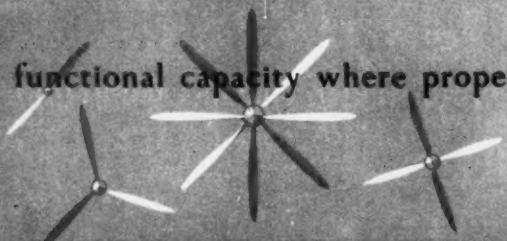
In Transport and Coastal Commands

In civil and military training

In fighting and bombing

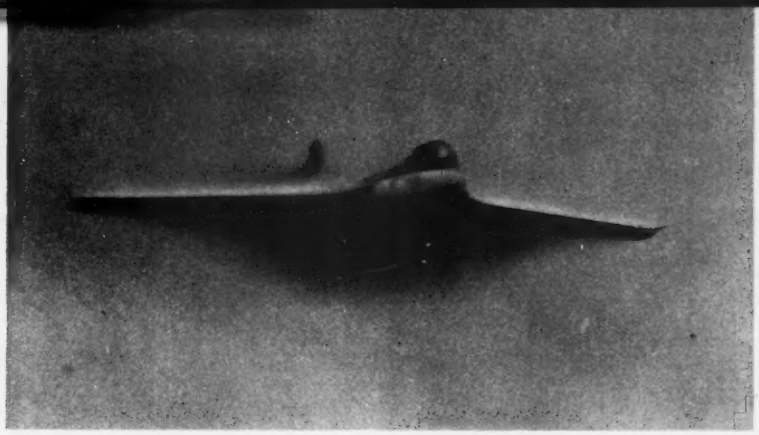
In ocean operations from ship and shore

In every functional capacity where propellers are used



DE HAVILLAND PROPELLERS

are pulling the loads

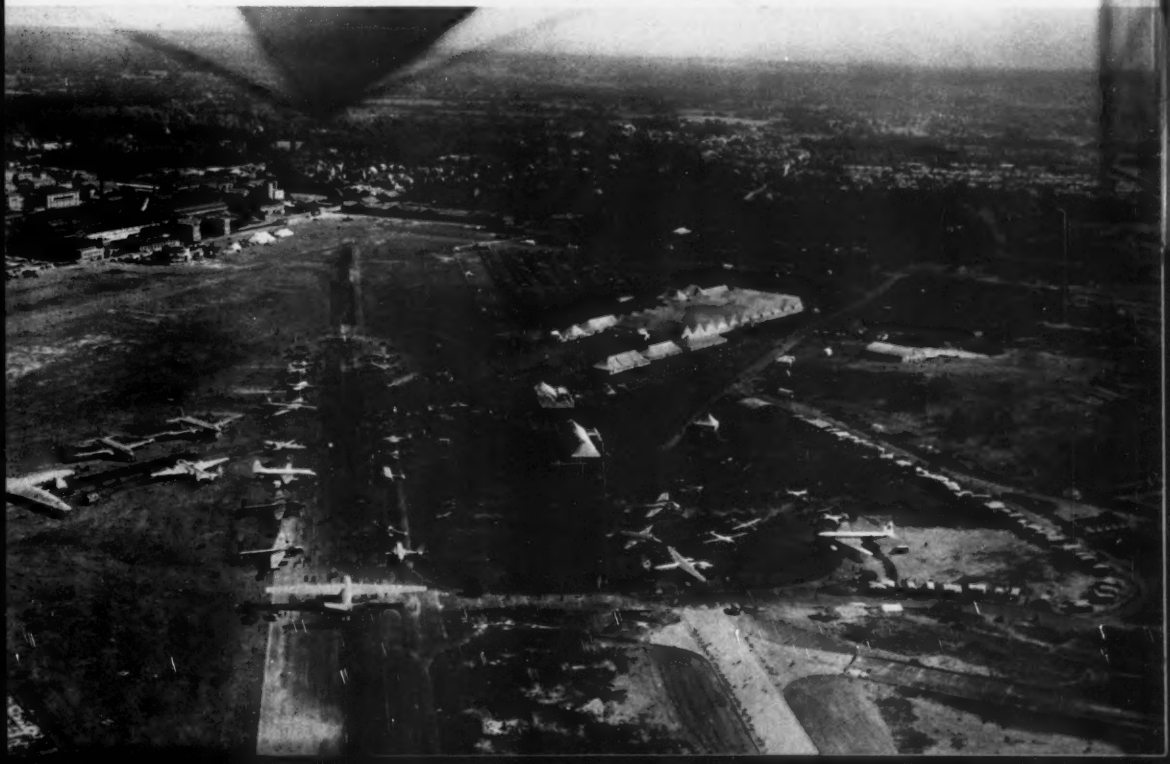


"FLIGHT"
PHOTOGRAPHS

MAKING A SPLASH

FOR months to come the incomparable spectacle of the Farnborough Display and the significance of developments unveiled there will be ever-rewarding topics of discussion. Argument will run high as to whether the cartwheel of Zurakowski, the record-speed dash by Duke, or "Roly" Falk's handling of the Avro 707 Delta was the finest piece of showmanship; whether Wheldon did 11 or 12 turns of a spin in the Provost on the Friday, and precisely why the Hawker P.1067 and naval P.1052 translated aerodynamics into hydrodynamics during Saturday's and Sunday's shows—as the 1052 is seen doing at the head of this page. Certainly the Society of British Aircraft Constructors and the exhibitors themselves set out to "make a splash" and spared no effort to disseminate the maximum amount of permitted information, the gist of which is recorded in this and the two previous issues of *Flight*. Few visitors, however, had the opportunity, as did our own photographer, of viewing the massed aircraft from above. The "aerials" on this page and overleaf, therefore, are particularly interesting and instructive—and, incidentally, will provide practice for recognition enthusiasts.

The vast clump of tenting is the Exhibition Hall, or "Static," with satellite bars and buffets; the two tents lying at an angle are the President's and that set aside for the journalists, whose numbers increase yearly. Distantly glimpsed at top left are the main R.A.E. buildings, prominent among which is a tall structure with two chimneys at its far end—the historic Balloon Shed.



MAKING A SPLASH . . .

Those who wish to try their eye at spotting the 44 aircraft in the view below may check their answers against the numbered and annotated key-diagram on page 438; those whose reactions are less academic may be interested to note the queue waiting to inspect the Brabazon's interior; the blast marks from the jets, clearly visible on the grass; and, in the right-hand picture, the braking-marks of tyres on the runway. Even the less expert will note that, in proportion at least, the plan-forms of the S.A. 4 and Canberra are not greatly dissimilar.

These photographs, and the aerial view on the previous page, were secured by *Flight* photographer L. W. McLaren, from the Auster B.4 ambulance-freighter, piloted by Ranald Porteous. The loading doors of the B.4 were removed and the photographs taken over the rear seats; surprisingly in these circumstances, the cabin was neither draughty nor particularly noisy. The picture on the left was taken at about 800ft and the one above at about 600ft.

STATIC ABSTRACTS

Points of Technical Interest Noted at Farnborough's Indoor Exhibition

ONCE again the under-cover "static" section of the S.B.A.C. Show provided a useful measure of the degree of specialization and perfection that has been attained by the aircraft-component manufacturers. Of a total of 195 stands, some 170 were devoted to aircraft ancillary equipment; 18 exhibited the immaculate sectioned products of the engine companies, or models of current and forthcoming aircraft; and half a dozen others were unclassifiable under these headings.

As ever, a stroll round the aisles under the vast roof of tenting was rewarding in direct ratio to the visitor's technical knowledge, and in the pages that follow we have noted points that caught a moderately critical eye. No attempt has been made at a stand-to-stand description, for the principal products of each component-exhibitor have already received mention ("Auxiliary Services" and "The Ancillary Industry," together with airframe and engine reviews, in our special number of September 7th). In general, also, we concentrate here on new developments rather than on items which have been displayed in previous years.

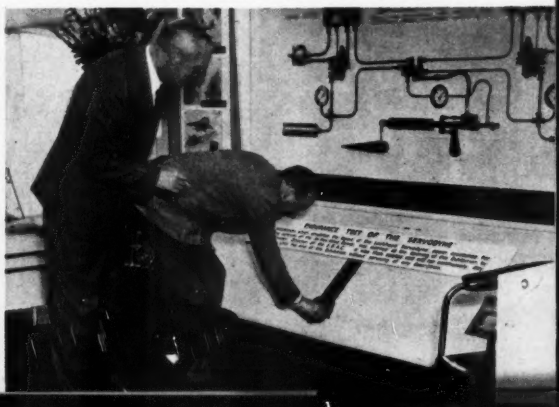
Smiths Aircraft Instruments, Ltd., for instance, had on show their new S.E.P.2 automatic pilot which, developed from that well-proven unit the S.E.P.1, has been designed to meet civil requirements. The main improvements in the S.E.P.2 are overall reduction in weight, additional flexibility of circuits to cater for high-speed transport work, the addition of a barometric height-lock, and the provision for coupling to I.L.S.

Harley Aircraft Landing Lamps displayed their new landing and taxi lamp, which has been developed to suit aircraft having a large angle of attack during approach. Control is by a three-position switch which selects approach, taxi and retract, and provision is made both for the automatic and manual selection of either of two filaments, namely 240-watt and 500-watt. The lamp, which may be inched to suit any desired position within its travel, retracts under a given air load.

Perhaps the most prominent Kelvin and Hughes exhibit was their Type IA periscopic sextant, a development of the original model by Hughes. The instrument, which is electrically operated from the aircraft 24-volt D.C. supply, is designed for use in pressurized aircraft and requires no astrodome. Among aircraft in which the instrument is installed are Canberras despatched to the R.A.A.F., the Comet and the Hermes. Another interesting product was a wrist altimeter designed for use during delayed parachute descents. This neat instrument utilizes as its prime mover an evacuated Bourdon tube connected by simple linkages to the needle spindle. The dial is marked 0, 10, and 40 thousand feet, but the instrument, fully temperature compensated (—50 deg C. to +70 deg C.) will operate up to 60,000ft. Also shown on the stand was the E2A stand-by compass recently described in *Flight*.

One of the products manufactured by The Hairlok Co., Ltd., is a dynamic model of a "standard man" used in conjunction with ejection seat and parachute testing. A cutaway section on the stand indicated that it is a fair representation of the human torso, though with several structural

At the head of the page and below, left, are representative views of some of the scores of stands which proudly bore the names of companies famous throughout the aviation world. Below, right, Mr. E. C. Bowyer, Director of the S.B.A.C., starts the Lockheed Servodyne display which, during the show, ran for over 600,000 reversals. With him is Mr. Fred Rowarth, the famous handicapper, who is general sales manager of Automotive Products.



. . . . there are people who

think the flying boat can never

equal the landplane

in performance

. . . . *how wrong they are!*

Fighter Flying Boats—Flying Boats for all purposes

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WORKS AT:— EAST COWES, ISLE OF WIGHT EASTLEIGH, SOUTHAMPTON BEAUMARIS, ANGLESEY

THE PERCIVAL

P.56 "PROVOST"

SIDE-BY-SIDE TWO-SEAT BASIC TRAINER

(Leonides Engine)

SELECTED FOR THE ROYAL AIR FORCE

". . . it remains only to be
said that the Boscombe Down report on
the aircraft was such as to be fairly described as
eulogistic, the rate of roll (about 90 deg/sec) and
the aileron response, in particular, being extraordinarily good.
In the P.56, therefore, it would seem that the
Royal Air Force can look forward
to having a basic trainer which, for its designed sphere,
is without doubt at the moment unrivalled." *"Flight" May 4th, 1951.*

PERCIVAL AIRCRAFT LTD., LUTON, BEDFORDSHIRE, ENGLAND and at TORONTO, CANADA.

A Hunting Group Company

STATIC ABSTRACTS . . .

simplifications. The construction is of steel-tube framework covered with the rubberized hair which this company has made famous for seat and armrest upholstery. Great care has gone into the manufacture of the model and each item has been designed to withstand, as nearly as possible, only those forces which can be endured by the human frame.

A working model of the Lockheed Servodyne was displayed by Automotive Products Co., Ltd., together with their hydraulic brake which is employed to reduce the "run down" time of turbo-props. The Borg and Beck clutch developed for helicopter transmission systems was also shown. The working model of the Servodyne which had been started officially by Mr. E. C. Bowyer, Director of the S.B.A.C., was originally intended to operate day and night throughout the exhibition; in the event, it was not run at night—owing, so we are informed, to objections from the night watchman! Even so, the display provided an effective example of the reliability of this well-known unit.

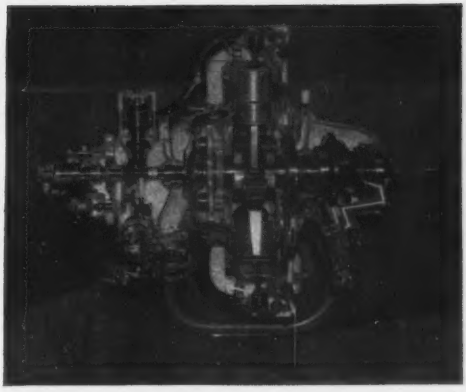
The large 4-in-bore spherical plug cock exhibited by Saunders Valve Co., Ltd., was designed primarily for flight-refuelling activities in America. This valve has a triple-diaphragm seating and is fully motorized. To meet the requirements of quick engine-changes in the latest turbojet aircraft, Saunders have also developed a fuel gate-valve which isolates the fuel at the engine connection; it is for maintenance use only, and cannot be operated from the cockpit. Other items included manually and electrically operated hot-air cocks and a 2in multi-way refuelling cock which provides for refuelling in either or both wing tanks separately or simultaneously.

Swimming Success

Used, incidentally, with great effect during the recent cross-channel swimming contest was the 8-lb Walkie-Talkie designed and displayed by Pye, Ltd. This compact unit has a range of two miles over favourable terrain although, in the channel crossing, contact was actually made from coast to coast. Another interesting item displayed by Pye was their Cathodeon automatic crash-switch which provides foolproof operation of fire-protection systems even in "gentle" crash landings. Actuation of the switch is entirely independent of the direction in which impact occurs, and is not controlled by inertia. The switch, which is contained in a glass envelope, is extremely compact (it measures 2⅛ in × ⅝ in dia.) and weighs only one ounce. In a crash landing, distortion of the aircraft skin breaks the envelope and in so doing completes a sensitive-contact circuit, thereby causing instantaneous operation of the switch.

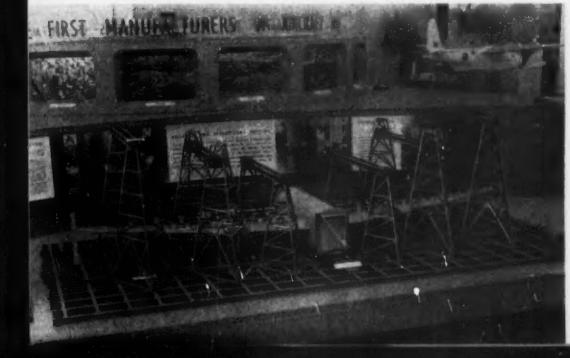
Normalair Ltd., who have extended their facilities to cover the design, development and production of oxygen equipment, displayed their new climb interrupter switch. This unit is a form of pressure switch designed for use with pressure controllers which incorporate a cabin-altitude selector mechanism, and its function is to prevent the cabin altitude overrunning the aircraft altitude should the aircraft be levelled out before reaching the height set on the selector—or, conversely, to prevent the differential pressure running down to zero should the aircraft, for any reason, not proceed with its preselected equivalent rate of descent. Additional functions of the climb interrupter switch are to allow the cabin altitude for cruising to be pre-selected before take-off, and to permit pre-selection, at a convenient time during cruising, of the cabin altitude at which it is desired that pressure control should be terminated.

The new and improved ejection seat exhibited by M.L. Aviation Co., Ltd., is fully automatic and has an ejection velocity of 80ft/sec compared with the figure of 50ft/sec for the previous model. To eject, it is necessary only to pull back one or both the wasp-coloured handles positioned on the seat beside the pilot's thighs. This releases the canopy, extends the foot-rests, retracts the gun-sight and closes the cartridge exhaust vent. A gentle push forward of the handles will then fire the single cartridge and, after the usual delay, the drogue parachute opens at 10,000ft in the normal way. In the event of the pilot forgetting to lower his visor, the inertia forces experienced will cause it to drop automatically.



A truly magnificent example of "sectioning," the 550 b.h.p. Leonides held attention on the Alvis stand.

Unusual among exhibitors, Short Brothers displayed some of their structural test methods, together with examples of typical failures.



The new fire-fighting system employed by the Pyrene Co., Ltd., provides the maximum use of the extinguishing medium for a minimum weight penalty. This is brought about by utilizing a single extinguisher to cover, *via* pipelines, various probable fire-sites in the aircraft. When an alarm signal indicates in which part of the aircraft the fire is situated, the bayonet type plug of the Duo-Head extinguisher is plugged into the appropriate quick-release socket and the CO_2 gas is then discharged. The sensitivity of the company's new smoke detector was illustrated admirably to the group of spectators that constantly surrounded this compact little light-sensitive unit. A puff of cigarette smoke blown into it instantaneously caused the visual and audible indicators to operate.

The Goodyear Tyre and Rubber Co. (G.B.), Ltd., displayed an attractively sectioned motorized model of their well-known castoring wheel, which facilitates landings in cross winds of up to 60 deg. A representative selection of Goodyear tyres was shown in addition to an example of the single-disc brake which is fitted to the wheels of, among other aircraft, the B.O.A.C. Argonauts.

Anglo-U.S. Interchangeability

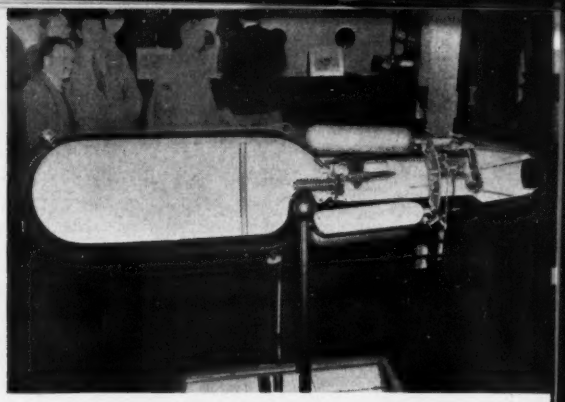
Great interest was aroused by Flight Refuelling, Ltd., who exhibited the major components of their probe-and-drogue system. The technique was not illustrated in this year's flying display, but the ease with which contact can be made has been shown favourably in previous years. New equipment included a ground pressure-refuelling coupling which is completely interchangeable with American units. Two adaptors are supplied, 2½in dia. for heavy aircraft and 1½in dia. for fighters. A mechanical locking device prevents the coupling from being dismantled until the fuel flow is switched off.

An interesting feature displayed by King Aircraft Corporation was their pilot's harness inertia-lock, which operates in the event of the pilot omitting to lock his harness before landing. A load of 2g, which may be experienced during a deck landing, will lock the harness instantaneously in any position. If the lock actuates whilst the pilot is leaning forward he may then lean back to any attitude and the harness will automatically "shorten" whilst maintaining the lock against any further forward movement. The lock and release handle is provided beside the pilot's seat in the usual position. Other equipment on view included a self-sealing full-bore fuel-coupling (which is locked automatically when the fuel is turned on either by hand or actuator) and a lighter replacement, in steel, of the aluminium standard A.G.S. filter.

The Graviner Manufacturing Co., Ltd., had on show their new strip-type crash-switch which augments their wide selection of switches for the prevention of fire hazards. This unit embodies a serrated metal strip which, under the inertia of a crash landing, pierces an insulating element and completes the electrical circuit. It is claimed that the sensitivity is such that extinguisher action is initiated before the aircraft batteries succumb to damage in the crash.

Also exhibited was the company's magnetic fire detector, the

The Type ACRE9 cold-air unit exhibited by Sir George Godfrey and Partners is an essential feature of cabin-conditioning equipment for many military aircraft.



The sectioned Sprite rocket motor was one of the exhibits that attracted interest on the de Havilland stand, for it was the first time that the internal details of this unit were publically displayed.

STATIC ABSTRACTS . . .

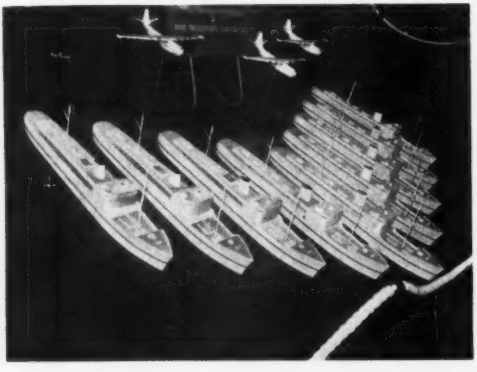
detector unit of which weighs only 2¼ ozs. The operation of this resetting-type indicator is based on the Curie point principle; that is, it takes advantage of the fact that certain metals change their magnetic properties on reaching certain temperatures. The adoption of this principle in fire detection is primarily advantageous in that no relays or valve amplifiers are required. The alloy of the temperature-sensing element governs the operating temperature and this figure, it is stated, cannot alter in service. The detector is robust, hermetically sealed and can be installed in fire zones with ambient air temperatures as high as 290 deg C. Detection time in standard flame is under two seconds. In addition, Graviner displayed a new type of continuous resetting detector which is undergoing development.

An impressive selection of gas-turbine fuel components was displayed by Joseph Lucas (Gas Turbine Equipment), Ltd., including a compact servo-controlled fuel pump which weighs 10 lb and at 4,500 r.p.m. continuously delivers 460 gal/hr. A new fuel pump was also shown which delivers up to 3,000 gallons of neat petrol per hour at 2,000 lb/sq in. This unit is, in effect, two pumps back-to-back, each delivering 1,500 gal/hr. A coloured cut-away drawing demonstrated the principle of the Lucas annular combustion system, which employs upstream burners. These burners, which are under development, were also displayed.

A working model of the latest Pacitor electronic fuel-contents gauge was shown on the stand of Simmonds Aerocessories, Ltd. The Type II, which is similar to the previous model, provides accurate measurement of the fuel content irrespective of aircraft attitude. The difference between the two models is that in the latest version the power unit and rectifier have been built into the large S.A.E.-type indicator; by this means a remarkably compact unit is achieved.

A handsome selection of the products of Hordern-Richmond,

A particularly telling display, this model exhibit of three Princess flying boats and nine 12,000-ton troopships on the Saunders-Roe stand had a moral which could scarcely be missed.



Ltd., was exhibited, including the Aeromatic automatically-variable-pitch airscrew, one of which was fitted to the Auster Model S. in the flying display. Also on the stand was a variety of cooling fans, large wind-tunnel fan blades and a selection of the rubber press tools which the company supply to industry. The fan blades and the rubber press tools are manufactured from the well-known Hy-Du-Lignum laminated wood.

Ferranti, Ltd., were showing on their stand a pre-prototype ground beacon and aerial system for the 1,000 mc/s distance-measuring equipment they have developed in line with the I.C.A.O. specification. The beacon has been designed for remote control, unattended operation and ease of servicing, and is similar to the three which are already installed at London Airport. An additional item of interest was the latest Mk 4E gyro gun-sight installation which is in process of becoming standard R.A.F. equipment.

To supplement the existing range of Gyrosyn Compasses, The Sperry Gyroscope Co., Ltd., displayed their new Type C.L.3. This unit has been introduced to meet the requirements of aircraft which do not carry an individual navigator or, on the other hand, have no available space for installation of the master unit of the standard C.L.2 installation. The new C.L.3 utilizes the standard gyro unit, amplifier and detector unit of the C.L.1A with the addition of a master unit which provides a step-by-step power transmission system and a synchronous transmission system (Selsyn). On another part of this stand was the new H.L.6 electric gyro-horizon for high speed aircraft, and the flight instrument panel which has been approved by B.E.A. and B.O.A.C. This new panel differs from the R.A.F. standard blind-flying panel in that the directional gyro and the rate of climb indicator have been replaced by two new instruments, the Zero Reader and I.L.S. indicator. In addition the turn-and-bank indicator has given way to a gyrosyn compass repeater. The instruments on the new panel are, reading from left to right, top row : A.S.I., gyro horizon and I.L.S. indicator; left to right, bottom row : altimeter, Zero Reader and Gyrosyn compass repeater.

High Accuracy Low Down

Standard Telephones and Cables, Ltd., displayed an interesting working model illustrating the accuracy of their new radio altimeter, the chief feature of which is the ability accurately to indicate extremely low heights. There are two ranges, 0-500ft and 0-5,000ft, each of which is shown by a separate indicator to avoid ambiguity. The important feature is that the 0-500ft indicator is calibrated logarithmically in order that, below 100ft, the pilot can read direct to an accuracy of 5ft. The second instrument, reading 0-5,000ft, is calibrated linearly and reading discrimination is to 100ft over the entire scale. A flag indicator is provided in each instrument to show if it is switched "on" or "off"; also, if an unsatisfactory signal is being received from the ground, the flag shows "off."

A useful addition to the range of synthetic trainers now in use, the new "high-speed" unit developed by Air Trainers, Ltd., is intended for the instruction of pupils up to the standard demanded by the latest fighters. The trainer installation consists of three completely new units, namely, trainer, computer and recorder. Although, unlike previous models, the trainer is static, simulated effects of g and buffeting have nevertheless been introduced.

A new high-speed revolution counter has been developed by the Plessey Company, Ltd., for airborne research. This unit, which has an electric counter, is basically similar to the larger type used for the ground research installations. The indicator consists of 16 neon bulbs forming a square; the four rows indicate thousands, hundreds, tens and units, while the columns read two, four, six and eight. By this means, and with suitable adjust-

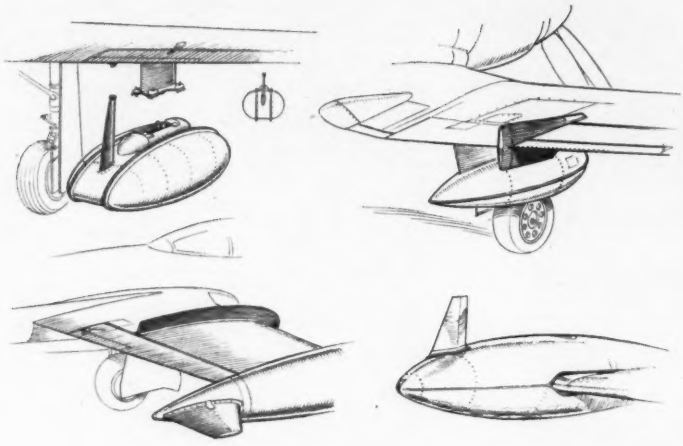
D. A. Daniel and Co., Ltd., are the manufacturers of this Type XH/1/D surface combustion heater as installed in Shackleton aircraft.

(Right) Export Packing Service, Ltd., showed a machine tool completely encased in a plastic envelope over which a water spray poured. Below are shown four more stands representing a typical variety of interest.

ment of the impulse generator, it is possible to obtain readings of up to 8,888 r.p.m. to within limits of plus or minus five.

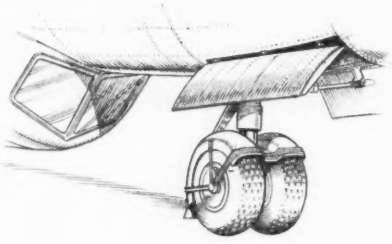
Avica Equipment, Ltd., aroused considerable interest with their new stainless-steel flexible hose assemblies, shown in addition to the well-established range of straight- and angular-end connections. These new hose assemblies are capable of withstanding temperatures of up to 300 deg C and are suitable for ducting hot air up to 1,000 lb/sq. in. It is claimed that they are lighter than the synthetic-rubber assemblies and have comparable bend radii.

[*Radio exhibits at Farnborough are to be reviewed in a special article in a forthcoming issue*]

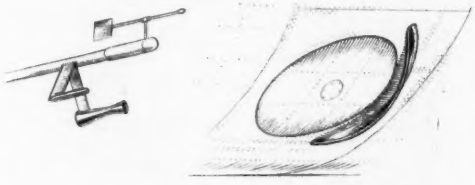


New styles in tanks, fins and fences are set by the Vickers Supermarine Attacker (top left), which can carry under each wing a "meringue" tank as alternative to a 1,000-lb bomb; the Westland Wyvern 4 (beside it) with trailing-edge fence and drop tank; the de Havilland Venom N.F.20 (middle left) with fence and a tip tank with throw-off fin; and the Gloster Meteor N.F.11 with a variation of the same equipment. (Lower left) Presenting something of a puzzle for spotters in this view, the twin nose-wheels of the Vickers Varsity are equipped with large stone/mud-guards to protect the bomb-aimer's windows.

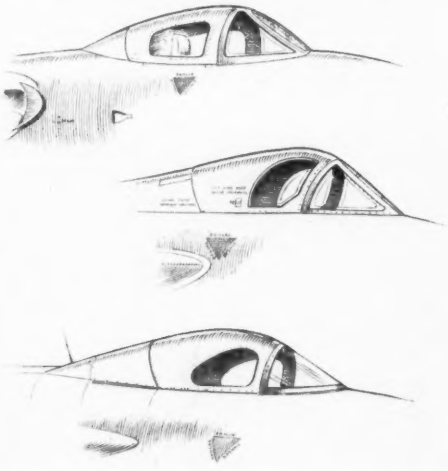
FARNBOROUGH



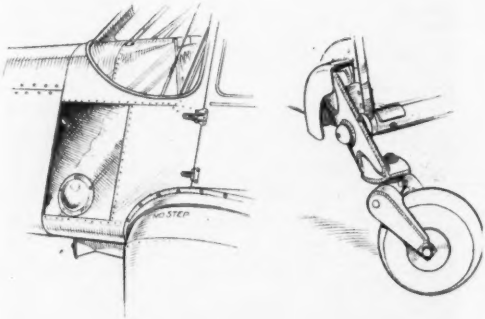
(Below) Those with an eye for detail will recognize the neat pressurehead venturi and yawmeter arrangements on the massive Blackburn and General Aircraft G.A.L.60, and the parachute escape hatch of the Avro Ashton.

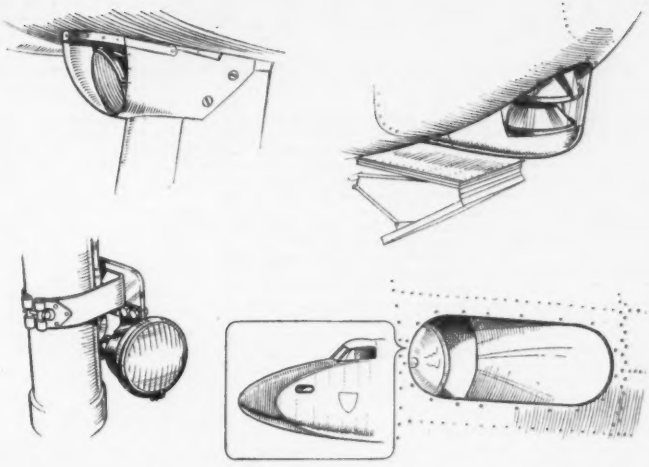


(Below) Canopy comparisons between the three deltas, checking downwards, are the Avro 707A, Boulton Paul P.111 and Fairey F.D.1. The 707B canopy is almost identical with that of the 707A, while the P.111 now has a flat screen. The F.D.1 retains its moulded screen.



(Below) Auster B.4 details shown are a cooling-air outlet at the rear of the Bombardier cowling and one of the sprung and castering rear wheels mounted at the lower rear edge of the hold.

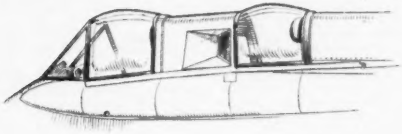


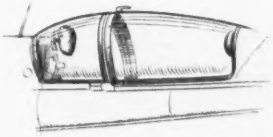


The lamps, clockwise from top right, belong to the Percival Prince for taxying; the Airspeed Ambassador for inspection of the leading edge if icing is suspected; the Handley Page Marathon, the taxying lamp folding with the wheels; and the Percival Prince, where the clean installation at the top of the fixed-leg fairing should have no measurable effect on performance.

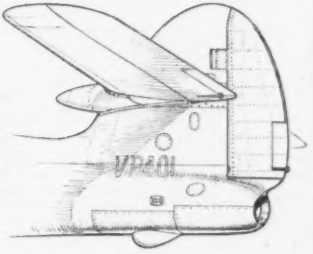
SKETCHBOOK

Detail drawings of the three Fairey Gannet canopies show them to be a good compromise between size for good view and streamlined shapeliness. Note the unusual recessed window between the front and mid cockpits. On production Gannets the rear canopy will probably be shorter.



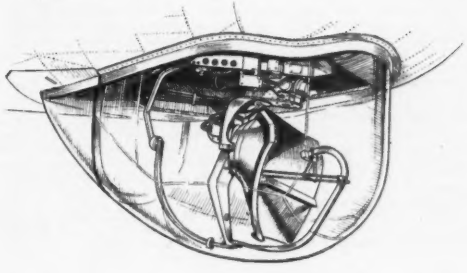


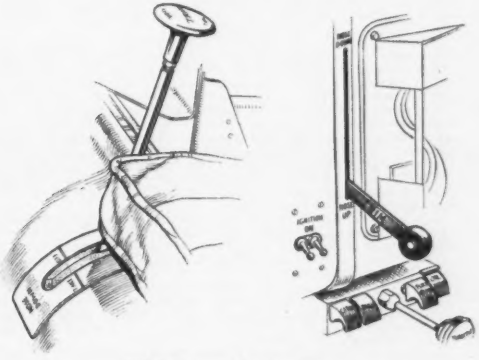
That a rocket installation need not mar good empennage lines is apparent in this drawing. The aircraft is, of course, the Hawker P.1072 with Armstrong Siddeley Snarler and Rolls-Royce Nene power.



(Below) Auster details, strange to earlier models, are the elevator trimmers on the Model 5 (left) and B.4 (right). In the case of the B.4 the lever is mounted centrally on the panel, the left portion of which is devoted to instruments and the right to radio. The push-pull throttle is just visible below the trimmer.

(Below) An unusually revealing illustration of radar equipment, in this case the large "beard" radome and scanner of the Shackleton.





"Flight" copyright drawings

WORK of I.A.T.A.'s COMMITTEES

Reports on Traffic, Technical, Legal and Financial Matters Presented at the A.G.M.

THOUGH much of the actual "in session" time of the I.A.T.A. Annual General Meeting was (as we reported last week) occupied by discussions on the forthcoming experiment with tourist fares on world routes, there were, of course, many other topical items on the agenda. Questions relating to the introduction of jet transport, for example, provided something of a link between the commercial and technical phases of the discussion. Large-scale use of this kind of equipment will naturally depend upon the speed with which airlines and governments can effect improvements in communications and meteorological services and provide the necessary navigational and traffic-control facilities to accommodate the high speeds, high altitudes and high fuel-consumption characteristic of jet-powered airliners. An appreciable part of the "talking time," therefore, was concentrated on the report of I.A.T.A.'s Technical Committee, which was delivered by its chairman, Mr. J. T. Dyment, of Trans-Canada Airlines. In addition to the activity of the main committee, the scope of this report also included a large number of working groups and I.A.T.A.'s European technical liaison office at London.

The Technical Committee

Speaking of I.A.T.A's relationship with other technical organizations, Mr. Dyment said that co-operation with the International Telecommunications Union had been intensified; that the Association had participated in the World Meteorological Organization's congress; and that it now has permanent representation on the "steering" committee of the International Standards Organization.

It had also been noticed during the past year, he said, that manufacturers had increased their representation at I.A.T.A.'s technical sessions, both sides having now recognized that it was of mutual interest to have a direct exchange of views on the operating requirements and design features of airline equipment, in order to achieve better and more economical results.

Mr. Dyment also mentioned the fact that although I.C.A.O.'s work during the past five years in setting up standards and recommended practices in all but a small part of the technical field had been largely satisfactory, in several regions implementation of these standards by governments had not progressed as quickly as was desired.

Further extracts from the Technical Committee's report, classified in accordance with the nature of the investigations undertaken by individual working groups, are summarized below:—

Communications and Radio Aids.—I.A.T.A. has been particularly concerned during the past year with attempts to gain permission of governments for the airlines to transmit "class B" commercial messages over the aeronautical fixed telecommunications networks rather than over commercial cables and leased wires. Both I.C.A.O. and I.T.U. now have the matter under consideration, and while no conclusive agreements have been reached a successful outcome is foreseen.

Special attention has also been paid to improving aids to final approach and landing and short-distance navigation—now considered to be something of a bottleneck, particularly in areas of high traffic-density.

Two working panels undertook a partial investigation of the I.C.A.O. standard I.L.S. They also made proposals for improving G.C.A., radar range and accuracy; and evaluated the potentialities of D.M.E. and Decca. Standard specifications were also drawn up for non-directional radio beacons, which I.A.T.A. feels will be in use for some years to come in low traffic-density areas, and for 75 mc/s beacons and Consol.

With the gradual introduction of pilot-operated R/T. communications on long international routes, I.A.T.A. has had to pay special attention to the establishment of world-wide standard procedures for its use; an R/T. "Procedures Manual" has been drafted and submitted to I.C.A.O., which has now disseminated the important sections of it to states as official I.C.A.O.-approved practices.

The expenditure of a considerable amount of time and money, and engagement of personnel, in developing, purchasing and installing better airborne equipment for R/T. communications is envisaged for airlines throughout the world, but it is thought that this will prove a worthwhile investment.

"Attempts to rationalize the original I.C.A.O. provisions for airworthiness of aircraft," says the report, "have so far resulted only in the existence of two differing sets of recommended practices, each advocated by different countries. Even though these are only recommended practices, this is not as desirable as removing both from the I.C.A.O. Annexes and permitting individual states to continue with their national requirements pending the finalization of a single new standard which can be agreed by all."

The I.S.O. Aviation Section has agreed to make the standardization of external couplings a first effort. I.A.T.A. hopes that couplings will be devised which will make it a very simple procedure to bring into use such procedures as underwing fuelling throughout the world without the use of flow-restricting adaptors.

Operations.—As the result of studies conducted by a specialist group of senior pilots concentrating on the crucial "last three minutes of flight," I.C.A.O. has asked its member states to conduct flight tests of a new arrangement of I.L.S. marker components to ease the transition from instrument to visual flight.

Analysis of approach lighting systems has also resulted in the conclusion that the requirements for low visibility systems can best be satisfied by a single row of high-intensity lights placed along the extension of the runway centre-line. The only systems that can be adapted to meet the group's requirements appear to be the Calvert and the American A.T.A.-A.L.P.A. systems.

The group is now proceeding with a study of threshold and runway lighting and methods by which to integrate it with approach aids.

I.A.T.A.'s European Air Traffic Control panel has now agreed on an immediate plan of control along routes in the European region having a weekly traffic density of 100 movements or more. Under these proposals, a network of reserved air lanes, aligned as far as possible with projected or existing airways in Europe, would be based on the facilities currently available and in use. The panel has been completely practical in its approach, realizing that any attempt to solve present traffic control problems in Europe must be designed with an eye on the exchequers of European governments.

I.A.T.A. has already taken special measures with I.C.A.O. and other authorities in order to eliminate or alleviate the problems set up by the increasing amount of military traffic and jet aircraft operations in Europe.

Traffic Conferences Report

The report of the I.A.T.A. Traffic Conferences covered the 1951 composite meetings of the three Traffic Conference areas into which the world is divided; it was submitted by R. E. S. Deichler, American Airlines. The Traffic Conferences provide the machinery for agreement between member carriers concerned in any international route on rates, fares, conditions of carriage and agency matters. These agreements must be reached by unanimous vote and are subject to the approval of interested governments before they can become effective.

The salient points of Mr. Deichler's report are given below:—

Both the machinery and extent of agreement were improved during the past year. Agreements were reached on fares and rates between North, Central and South American points (which was the last major gap in the world-wide rate structure) and on such routes as that between London and Sydney, which can be served both east-about and west-about.

The enforcement of Conference agreements through an I.A.T.A. inspectorate has brought about more careful and less ambiguous drafting of Conference resolutions.

While the Bermuda resolutions were notable for the number of agreements reached—running to upwards of 500 unanimous resolutions—it was felt that too much time had been spent in the discussion of devices by which one airline could lure traffic away from a competitor. This kind of business amounts to a very small percentage of any carrier's payload and is not worth the effort and expense necessary to get it.

The establishment of an I.A.T.A. Traffic Management Committee is considered necessary to handle the numerous management and economic problems with which airlines are now faced.

Many basic traffic policies should be studied in the light of their effect on the trend of fares and rates and, primarily, on profits. The tourist service is a good example of how an emotion for a popular service can very well overcome the hard facts of business.

The Legal Committee

The report of the Legal Committee—submitted by its chairman, Mr. K. H. Staple, secretary and legal counsel to B.O.A.C.—covered also the activities of the special Warsaw Convention Committee and a number of special studies made by I.A.T.A.'s Legal Adviser. The committee is composed of legal experts from a number of member airlines and they act as consultants to the whole industry. Excerpts from the reports are given below:—

Some time was spent during the past year in trying to arrive at a satisfactory definition of "scheduled international air service" under the Chicago Convention on Civil Aviation. The question is at present being discussed by I.C.A.O. and is important because the definition would set a line between scheduled and non-scheduled commercial flying, which are subject to different kinds of government regulation. So far, no definition has been found which all parties feel distinguishes adequately between the two types of operation and which takes into account all of their characteristics.

Another continuing problem is the legal sufficiency of the proposed Traffic Conference resolutions governing charter rates. It is felt that present charter resolutions contain too many loopholes. There should also be some means of resolving the two divergent attitudes on the part of the airlines toward their conditions of carriage, which are the basic contract between the carrier and the purchaser of passenger or cargo space. For wholly efficient interline business, these conditions should be identical among all members.

Little value has been found in a suggestion that I.A.T.A. transport documents contain a clause under which airlines may disclaim liability for damage or loss of baggage and cargo due to navigational errors on the part of crew.

Member airlines are warned that they may experience difficulties as a result of selling tickets in India, and possibly in other countries, to persons under 21 years of age; an airline ticket in a legal sense is a contract, and such contracts with minors are void. Members are to be supplied with a suggested form of indemnity bonding the parents or guardians of minors buying tickets.

During the year opinions were also given, and studies made, on such subjects as the Warsaw and Rome Conventions on liability, and the legal aspects of insurance, interline traffic and ground-handling problems.

(*Concluded on page* 433)

ACHIEVEMENT

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CIVIL AVIATION

HARD-WORKED DAKOTAS of Australian National Airways carried the bulk of the 65,000 passengers and 73,000,000 lb of freight which comprised this busy airline's record traffic result for the year ended June, 1951. Here are three of them at Mascot (Sydney), being re-fuelled before their day's work.

SEVENTH "COMMONWEALTH" LECTURE

ON Thursday, October 4th, the Seventh British Commonwealth and Empire Lecture will be delivered before R.Ae.S. members at the Institution of Civil Engineers, Great George Street, London, S.W.1. The author of this year's paper is A.V-M. Sir Leonard Isitt, K.B.E., R.N.Z.A.F. (ret.) and his subject: "Air Transport in New Zealand and the South Pacific."

Sir Leonard is chairman of New Zealand's State-owned National Airways Corporation and of Tasman Empire Airways, Ltd.; he is also a director of British Commonwealth Pacific Airlines, Ltd. His knowledge of his chosen subject, therefore, springs from first-hand and unlimited experience. In view of the recent survey flights which have been taking place in the South Pacific, Sir Leonard's lecture will be particularly topical, especially as the establishment of further trans-Pacific routes is rapidly becoming a matter of strategic importance.

A B.E.A. DISAPPOINTMENT

A RECENT B.E.A. statement reveals that the Corporation showed a cumulative loss of £19,887 for the first four months of the current financial year, as compared with a profit of £6,969 for the same period last year. This was in spite of an all-time revenue record, of £1,155,160, which gave an operating profit of £103,011. But for the payment of some £90,000 of fuel tax on internal services there would have been a profit of £70,000 for that period. (Fuel tax is not payable on services to points outside the United Kingdom.)

The cumulative results for the year ended July last show a loss of £1,006,123, a reduction of 18 per cent over the figure for the previous period.

U.S. MAIL PAY DECISION

THE United States Senate last week approved by 52 votes to 28 a bill limiting "oversea" operators' subsidies to those companies holding certificates as mail carriers. P.A.A. and T.W.A., therefore, are the only two companies who will continue to be subsidized. It was originally proposed that oversea carriers of "persons or property" would also be eligible for subsidies, but this was later ruled out by an amendment.

A new scale of rates for mail payment to domestic airlines is also being drawn up and will come into force on July 1st, 1952. Additional payments to maintain airlines in a sound financial state will, in future, count as subsidies. One clause of the bill states that rates paid to American airlines carrying mail abroad should not be lower than those paid to foreign companies for similar services, and no higher than those approved by the Universal Postal Union.

An amendment was also adopted permitting the Civil Aeronautics Board to sign long-term subsidy contracts with airlines operating both foreign and domestic services.

THE 40-PASSENGER HELICOPTER

A LONG-RANGE forecast of the dates by which large-scale passenger helicopter services may be expected in the United Kingdom has been given by Mr. Peter Masefield, chief executive of B.E.A. He emphasizes that only machines of 40-seat capacity will be able to operate economically at acceptable fares. The fact that helicopters carrying up to 40 men are now in production for the U.S. Army inevitably makes Mr. Masefield's forecast look disappointing; but he is probably wise in not erring on the optimistic side. Briefly, his time-table makes the following suggestions:—

1953—Experimental operations with one Bristol 173 12/14-passenger helicopter.
1955—Preliminary scheduled passenger services with Bristol 173s.
1957—Introduction of a developed and enlarged version of the Bristol 173.
1960—Preliminary services with a large commercial helicopter.
1965—The large helicopter established as an economic commercial vehicle.

Nevertheless, B.E.A. is apparently pressing hard for a speedier rate of development in the hope that these dates can be improved upon.

THE SEALAND'S NEW WORLD TOUR

THE Short Sealand amphibian which is making a demonstration tour of the Americas has completed its flights in South America and, flying *via* Toronto, has reached Vancouver. It will now demonstrate its capabilities at many places throughout Canada, where a large number of amphibious aircraft are already in use.

Two of these versatile machines, incidentally, were recently purchased by Jugoslovenski Aerotransport for service on routes between Zagreb and towns along the Dalmatian coast. In Norway, Vestlandske Luftfartselskap, who operate a Sealand on routes linking Norway's capital cities with coastal towns and islands, report full bookings and high utilization on all services. Pilots and ground crews are said to be equally pleased with the ease of handling and maintenance that are Sealand characteristics.

RECORD TRANSATLANTIC TRAVEL

A PREDICTION by statistical experts that transatlantic airlines would experience no great increase in traffic results this year has been proved wrong. Statistics compiled by the U.S. Department of Commerce show that a total of 702,500 international passengers flew out of the United States between May 15th and September 8th, as compared with only 571,700 in the corresponding period of last year. The great majority of the flights were to Europe. In spite of the fact that the Festival of Britain and the Parisian 2,000th anniversary celebrations took place this summer, experts had still not considered that results would approach last year's total traffic volume, which was, of course, boosted considerably by the numerous pilgrimages to the Holy Year celebrations in Rome.

Oddly enough, although transatlantic travel records were broken this summer, advance bookings were poor. One theory is that passengers have realized that services to Europe are now so regular and dependable that advance bookings are no longer necessary; another concerns the general feeling of tension due to the international situation.

For B.O.A.C., who flew 14 services a week between New York and Britain this summer, business in the April-June quarter

CIVIL AVIATION . . .

increased by 45·8 per cent as compared with the corresponding period of last year.

Pan-American reported a 35 per cent gain between May and April, while T.W.A.'s improvement in passenger traffic was about 20 per cent. Most airlines consider the outlook to be fairly good for the autumn, but long-range forecasts for next year are that traffic will be below this year's level. The only major passenger-attracting event in Europe will be the 1952 Olympic Games, which are to be held in Oslo and Helsinki. S.A.S. are expecting to benefit considerably from the influx of tourists and a number of inclusive-rate tours from the United States are already being organized.

TOURIST FARES CONTROVERSY

THE plan to introduce tourist-class travel on the North Atlantic route—which formed one of the main topics of discussion at the recent I.A.T.A. annual general meeting, held in London—is having a rather stormier passage than had been expected. Representatives of eleven transatlantic operators met last week in an attempt to define the precise tourist fares which were to be charged during an experimental period of six months' operation to begin in October, 1952. They failed to reach agreement, and it is understood that the agenda was not completed because of general opposition offered to the proposals put forward by Pan-American Airways.

A statement issued by I.A.T.A. said that the group, which was a special sub-committee of the I.A.T.A. Traffic Conferences, found that it would not be possible to bring the programme into effect by means of a mail vote among the Association's members, and that it would therefore have to be referred to a further meeting of the Traffic Conferences, which is to be held some time in November. The intention of the operators concerned to introduce low-cost fares on the North Atlantic route by October, 1952, as originally decided at the Bermuda Conference last May, remains unaltered.

Pan-American's vice-president, Mr. Willis Lipscomb, alleged that certain companies had taken advantage of the technical objections of the C.A.B. to repudiate the agreement reached at Bermuda. He told the meeting that Pan American intended "either within the framework of I.A.T.A., or outside it, if necessary," to obtain the required permit to introduce tourist fares on North Atlantic services next year "at rates which will appeal to the general public." He hoped it would be possible to obtain general agreement at the forthcoming meeting in November, but said that his company would not agree to a rate-structure which did not provide tourist fares on this route. Mr. Lipscomb believed there would be a substantial increase in the numbers of people travelling if fares were to be drastically reduced. At Bermuda it was provisionally decided that a tourist programme should begin in 1952, with a maximum fare of 250 dollars, the precise amount to be determined by cost surveys carried out by a special I.A.T.A. sub-committee. This committee supported the 250-dollar proposal which, however, met with technical disapproval from the U.S. government who would not agree to a limit of four flights a week. The C.A.B. also suggested an earlier starting date than October, 1952.

Answering Mr. Lipscomb's allegation that the Bermuda decision was being repudiated, the spokesman for B.O.A.C. said that, so far as the Corporation was concerned, there was no question of repudiation—but that, as the C.A.B. had rejected an essential part of the agreement, the whole basis of it was changed and therefore required further consideration.

Unless, by general consent, precise rates and frequencies are fixed in November, a rate war seems likely on transatlantic services next year. The November Traffic Conference will be the last opportunity for airlines to reach an agreement before April 1st, 1952, when the present fare-structure for the North Atlantic is due to expire.

ANGLO-SCANDINAVIAN AGREEMENTS

NEGOTIATIONS which have been conducted recently between delegations from Denmark, Norway and Sweden, on the one hand, and the United Kingdom on the other, were concluded last Friday by the initialling of bilateral agreements governing the exchange of air transport rights between the four countries. The agreements, which are subject to the approval of the individual governments concerned, recognize the special position of S.A.S. as the joint organization operating on the routes exercising traffic rights in the three interested countries. In scope they cover the exchange of rights on routes between Britain and Scandinavia, and also on those serving Africa, the Far East and Northern Europe.

PEST CONTROLLER: In addition to the two Hiller helicopters, which, as reported on p. 433, were recently flown out to the Sudan, Pest Control, Ltd., are also sending out an Auster fitted with experimental spraying gear; it is making the 4,000-mile journey under its own power. The pilot is Mr. G. N. Snarey, who was formerly a test pilot with Austers.

U.K. AIRFIELD ACTIVITY

ALTHOUGH the number of air-transport movements recorded at United Kingdom airfields in June—figures for which are now available—was nearly five per cent fewer than in the corresponding month of the previous year, the number of passengers handled increased by 16.6 per cent to a total of 284,858. The amount of freight on- and off-loaded during the month totalled 4,613 short tons, or 39.4 per cent more than in June, 1950.

At London Airport air-transport movements amounted to 3,507 and the passenger total was 81,318; these were increases of 42.4 and 60.2 per cent respectively and were due in part to the transfer of services from Northolt. The passenger total at Northolt was 81,021, with 4,534 aircraft movements. Detailed figures are:—

Airfields	Aircraft Movements: Total	Air Transport	Other	Passengers Handled (Terminal and Transit)	Freight (Short Tons)
June totals, M.C.A. and other U.K. airfields: 1951	56,604	20,814	35,790	284,885	4,613.1
1950	54,815	21,858	32,957	244,423	3,310.0
London area airfields, June 1951:					
*London	4,701	3,507	1,194	81,318	1,260.6
*Northolt	5,597	4,534	1,063	81,021	656.8
*Blackbushe	2,900	220	2,680	3,803	192.3
*Bovingdon	1,983	91	1,892	1,436	87.4
*Croydon	2,041	470	1,571	1,117	115.5
*Gatwick	434	72	362	476	—
Stansted	690	1	689	—	—
Provincial airfields, June 1951:					
Aberdeen (Dyce)	2,284	358	1,926	1,595	11.1
*Belfast (Nutts Corner)	963	861	102	13,978	196.0
Benbecula	139	125	14	863	1.4
*Birmingham (Elmdon)	1,742	541	1,201	4,442	39.0
Blackpool (Squires Gate)	3,259	398	2,861	1,698	1.4
Bristol (Lulsgate Bottom)	18	—	18	—	—
*Bristol (Whitchurch)	2,081	137	1,944	1,091	5.3
*Cardiff	3,225	285	2,940	937	—
*Edinburgh (Turnhouse)	1,200	154	1,046	2,138	1.6
*Exeter	808	4	804	16	—
*Glasgow (Renfrew)	1,949	1,053	896	14,248	36.6
*Hurn	650	80	570	369	2.3
Inverness (Dalcross)	142	133	9	576	1.3
Islay (Port Ellen)	134	110	24	424	2.9
*Isle of Man (Ronaldsway)	1,824	1,476	348	16,714	31.9
Kintyre (Machrihanish)	154	106	48	355	3.4
Kirkwall	471	449	22	1,712	8.1
Lands End (St. Just)	519	501	18	2,430	1.8
Leeds (Yeadon)	771	111	660	415	—
*Liverpool (Speke)	2,005	615	1,390	8,666	75.0
*Lympne	1,814	774	1,040	4,011	1,501.9
*Manchester (Ringway)	2,063	1,051	1,012	13,191	295.2
Nottingham (Tollerton)	288	8	280	16	—
*Prestwick	1,644	814	830	14,068	45.9
Shoreham	974	46	928	167	—
Scilly Isles (St. Marys)	539	507	32	2,457	1.6
*Southampton (Eastleigh)	1,854	396	1,458	5,699	4.4
*Southampton Water	5	5	—	71	—
*Southend (Rochford)	3,745	114	3,631	812	22.5
Stornoway	142	98	44	839	4.4
Sumburgh	141	134	7	594	3.9
Tiree	139	114	25	274	1.1
Weston-super-Mare	318	121	197	230	—
Wick	254	240	14	618	0.6
Channel Islands, June 1951:					
Alderney	n.a.	301	n.a.	1,186	22.4
Guernsey	n.a.	1,262	n.a.	10,360	61.6
Jersey	n.a.	2,093	n.a.	23,812	56.2

* Customs Airport. n.a. = not available. — = nil or negligible.

CIVIL AVIATION . . .

BREVITIES

A BRITON, Mr. Thomas Holt, has been appointed president of a new air transport concern which has been formed at Trieste. Known as the Trieste Airways Company, it will begin operating in three weeks time. The first routes are: Trieste-Athens-Cyprus-Bejrut; Trieste-Vienne-Geneva; and Trieste-Zagreb-Belgrade.

* * *

With confirmed and provisional orders received to date the Lockheed Aircraft Corporation is likely to continue the production of L-1049 Super Constellations well into 1954. These machines are at present being built for seven airlines: Eastern, T.W.A., K.L.M., Air France, Pakistan, T.C.A., and Qantas. A total of 68 civil versions have been ordered to date plus a further 71 military conversions for the U.S. Air Force and Navy.

* * *

On September 17th, S.A.S. celebrated its fifth anniversary of operations on the North Atlantic route. All passengers on board three S.A.S. airliners crossing the Atlantic received a letter from the company's president, the gift of an overnight bag, and a special dinner. During the five years S.A.S. trans-Atlantic aircraft have made a total of 3,357 flights, in which more than 86,740 passengers were carried.

* * *

Two of the Hiller helicopters operated by Pest Control, Ltd., were recently flown to the Sudan in a Bristol Freighter, to begin another onslaught on the jassid pest which periodically attacks the cotton crop in that region. The total area of cotton fields treated by air and ground equipment of this company last year was nearly 200,000 acres; this year's acreage is expected to be even greater. The two helicopters left Britain on September 17th, having completed, since May, a spraying programme in this country involving over 16,000 acres.

* * *

The A.R.B. announces the issue of two *Notices to Licensed Engineers and Owners of Civil Aircraft*. Notice No. 1, Issue 3 (September 1st) is actually a new foreword. The second notice, No. 2, Issue 8 (September 1st) deals with new procedures for the renewal of aircraft maintenance engineers' licences. The procedure whereby engineers were requested to complete supervisory reports every six months has been discontinued and licences will in future be renewed on application, provided that during the preceding two years the applicant has spent at least six months on work which has been under the supervision of the Board.

* * *

A novel electrical method of discouraging birds from sitting on or near airfield buildings has been evolved by an American company. The apparatus comprises a pulse generator and pulse transformer which energizes an exposed circuit of wire. The latter emits gentle shock impulses which, although not harming the bird, nevertheless make its perch uncomfortable enough to be discouraging. The cost of an installation is said to be about $2,000.

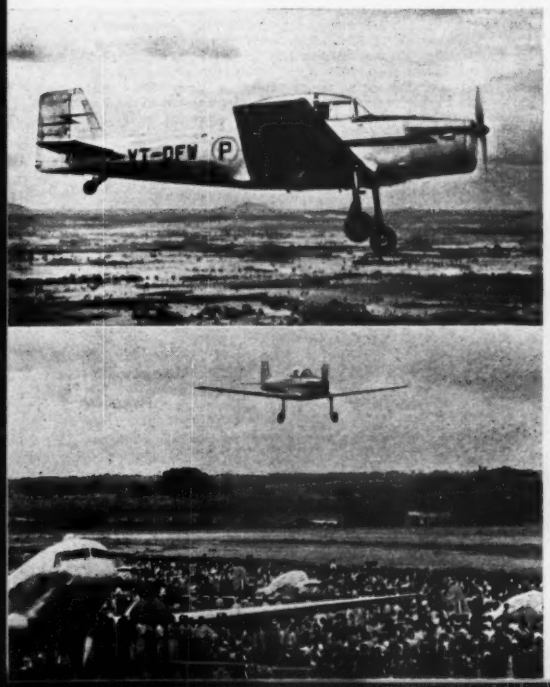
* * *

An unusual charter has recently been arranged involving the carriage of some 450 construction workers from Oslo to Sydney. The contract had been negotiated for several months but was hindered by the current aircraft and petrol shortages. Because of the scarcity of fuel, the passengers will fly the west-about route via New York and San Francisco, and three distinct operators will perform each whole trip. Even so, the fact that the booking is on a charter basis has permitted fares which are lower than the ordinary airline rates.

* * *

In order to raise the standard of safety among pilots engaged on aerial top-dressing operations, the New Zealand Department of Civil Aviation now demands that companies participating in these activities must obtain a permit to do so. The company's chief pilot will then be approved by the Department and authorized to train other pilots. An official training curriculum has been laid down which includes at least five hours familiarization in aerial work procedures. Under these regulations, also, chief pilots will require at least 800 hours total flying before being licensed. There are now 26 such companies operating in New Zealand.

MADE IN INDIA: The first aircraft to have been designed and built exclusively in India, this two-seat H.T.2 all-metal trainer (built by Hindustan Aircraft, Ltd.) made its maiden flight on August 13th in the hands of the firm's chief test pilot, Capt. Munshi. These two photographs were secured of the first flight, during which, it is reported, the pilot's confidence in the aircraft encouraged him to perform the complete range of aerobatics, to the delight of hundreds of H.A.C. workers who had assembled for the occasion. A brief description of the trainer appeared in "Flight" of August 31st.



WORK OF I.A.T.A.'s COMMITTEES

(*Continued from page* 430)

Financial Committee Report

The Financial Committee's report was presented by Mr. R. L. Weir, of B.E.A., chairman-elect of the committee, on behalf of the retiring chairman, Mr. L. S. Holstad of Northwest Airlines (U.S.A.). It covers the activities of a standing committee of airline treasurers, comptrollers and other fiscal experts who deal with accountancy, statistical, insurance and similar problems on behalf of the industry. This committee—which, incidentally, also supervises the work of the I.A.T.A. Clearing House at London—reports continued progress toward greater uniformity among airlines in accounting for the business which they do with one another and somewhat slower, but encouraging, advances in the standardization of accounting and statistical reporting practices generally. The major problem is still to reconcile and adjust the different ways of doing business which developed among European and American airlines in the pre-war years. Other points from the report are summarized below:—

New sets of proposed forms for operating, profit and loss and surplus statements—developed by the committee—have met with keen interest among a large number of member airlines. These are considered an important step toward fully standardized airline accounting and will eventually be used for reporting cost figures to the I.A.T.A. Traffic Conferences for the computation of rates, and for the submission of statistical data to I.A.T.A.

In the insurance field, I.A.T.A.'s Financial Committee decided against recommendations to standardize voluntary passenger accident insurance policies in various parts of the world. The door to such efforts has not been closed, however, and the idea can be revived if there is enough demand from the airlines or the general public.

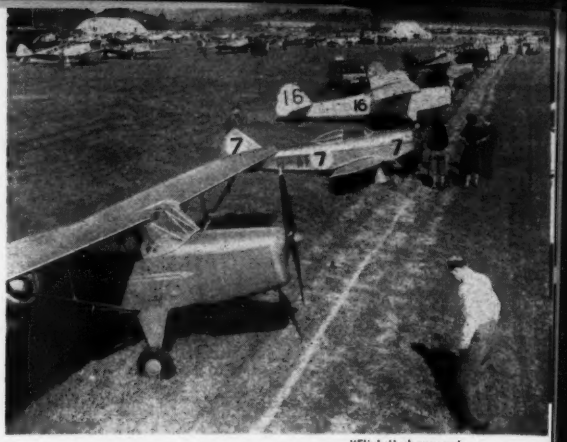
As the governing body of the I.A.T.A. Clearing House in London, the Committee announced that the total turnover during 1950 was £52,107,212 ($148,700,000), an increase of nine per cent over the 1949 level. Eighty-four per cent of the claims between member companies were settled by offset methods, without cash payment or exchange premiums. Operation of the Clearing House cost members only 16 pence per £100 of claims (66 cents per $1,000), the lowest cost since the project was started in 1947.

Both the West German authorities and the Allied High Commissioners have approved the Clearing House as a certifying agency for the quarterly claims by I.A.T.A. members operating in Germany.

An experimental method of calculating clearances in terms of ton-kilometres instead of monetary units has proved highly successful. Dr. W. Berchtold, of Swissair, estimated that his company would have saved at least £1,500 in seven months if the new system had been in operational use instead of being carried out in parallel with the former method. The difference between results achieved by the two methods amounted only to about 1d per £100. The experiment is to continue for a full twelve months and is about to be introduced for trans-Atlantic routes.

SOUTH COAST CONTEST

H. M. Kendall (Chilton) Confounds the Handicappers: a Magnificently Supported Race



"Flight" photograph

Toeing the line: Some of the earlier starters at Shoreham. In the foreground is Francis's Auster J.4; next is the winning Chilton, and beyond that Capt. Crosfield's Autocrat.

IF the air-racing enthusiasts who foregathered at Shoreham last Saturday held secret hopes that the afternoon's entertainment might be flavoured with something of the unusual or spectacular, their wishes were certainly fulfilled. The sport provided by the second—and this time successful—attempt to fly off the *Daily Express* South Coast Race more than compensated for the disappointment caused by the cancellation of the first attempt on August Bank Holiday. As originally arranged, the course, starting from Shoreham Airport, ran along the coast to Newhaven then across country to Whitstable and back round the coast to cross the finishing line at Brighton West Pier.

A total of 60 highly tuned—and even more highly polished—machines lined up for the start; 11 more entries had been received since the postponement, but three entrants had scratched at the last moment. The 186-mile aerial marathon was completed by all but three of the starting aircraft, and an epic win was achieved by Hugh Kendall, chief test pilot of Handley Page (Reading), Ltd., who in his tiny Chilton D.W.1 monoplane romped home several miles ahead of the second machine—much to the dismay of the handicappers, who had estimated that Kendall would have taken approximately 8 min 15 sec more than he did to reach the finishing line.

Second and third places respectively went to T. W. Hayhow (Auster Aiglet) and Capt. J. H. Christie, a Norwegian S.A.S. pilot, flying a Klemm Kl.35D. The complete finishing order is given in the table.

Unusually for this summer, the weather, if a little bumpy over the land, had otherwise provided very fair conditions for racing. Visibility was from six to ten miles, though with a slight haze which emphasized the need for first-class navigation.

The de Havilland Comet flew round the course, as did a Naval Aviation formation of Attackers. Then, at 2.30 precisely, following a morning of feverish preparation and last-minute polishing, Capt. R. E. Gillman's gallant old Avro Avian trundled off at the drop of Mr. Phillip Mayne's green flag, and the race was on. One after another, and sometimes in groups, the sixty machines strained against their brakes and then leaped eagerly forward as the stop-watches ticked-off their respective handicap limits. Gradually the colourful array dwindled as the aircraft took off and disappeared low over the railway track bordering the airfield. Finally, some 76¾ minutes after the Avian, the well-tuned roar of Jeffrey Quill's silver Spitfire 22 announced the departure of the scratch machine and attention was then focussed on reports from the various turning points—from the earlier of which the Royal Observer Corps had already indicated Kendall's Chilton to be well in the lead.

Newhaven Notes

It can be said without hesitation that the seaward end of Newhaven's half-mile-long stone breakwater, which marked the point for the 60-deg turn on to the overland leg of the course, was by far the finest vantage-point. Perhaps it was as well, however, that the fact was not generally realized, for there is comfortable space alongside the little lighthouse for but a few dozen people. As it was, the spectacle was enjoyed by the R.O.C. observers of Post L.3 (Newhaven), a few anglers, and half a dozen others.

This point was only 17¼ miles from the start, so it was not surprising that Gillman's Avian, first away at Shoreham by 2 min 30 sec, was first to arrive; it approached ten feet above the confused, sun-sparkling sea, and went into a steep climbing turn round the lighthouse. Marler in the Tiger Moth, by contrast, took the turn at about 200ft. Mrs. Grace's Taylorcraft came round in close company with Hull's Moth, and then David Cotter passed so close and so low that from our vantage-point 30ft above the water we were actually looking down on the Taylorcraft, whose port wing-tip could not have been more than 8ft from the water.

Thereafter aircraft came thick and fast, a few high and far out, so that it was difficult to read their numbers against the sun, but many so close-in and low that, from this unique grandstand it was literally possible to look right down into their cockpits as they roared past. Francis (Auster J.4), for instance, brought his wing-tip within feet of the stonework, and Neville Duke, with the Tomtit's Mongoose emitting its characteristic deep throb, was clearly recognisable by his features as he glanced casually at the little knot of watchers. Kendall's Chilton, appearing noticeably fast, purred round in a beautifully clean sweep, as did OO-ULA, Mathew's Tipsy Junior.

Miss Curtis in the Wicko and Pat Fillingham in the Moth Minor Coupé provided a moment's alarm, if not despondency, by swoop-

Back-markers: Count Bonzi's Ambrosini, Somers's Gemini, Quill's Spitfire and Murphy's Hurricane.

"Flight" photograph

"Flight" photographs

(Left) Mrs. Y. M. Grace receives the congratulations of the Hon. Max Aitken on receiving the women's prize. (Right) Hugh Kendall with the coveted Trophy. On his right hand is Capt. Christie (third) and on his left H. Hayhow (second).

ing on to the lighthouse like two seagulls after the same piece of fish; it rather looked as though the Wicko pilot had not seen the other aircraft turning below. A few minutes later Lawrence's Messenger (above) and Fisher's Miles Monarch (below) also did some close stacking, but neither incident really approached the "phenomenal avoidance" category.

Derek Dempster's Chilton and Ross's Hawk Trainer turned very low and close in, but thereafter, with the faster and less "nippy" aircraft arriving, few other pilots passed within a stone's throw—not that anyone, with the possible exception of the interrupted anglers, contemplated such action.

McIntosh's Proctor was emitting a Thunderjet-like trail of black smoke, and the engine of Lyle's Proctor was misfiring. Purvis (Proctor), after making his turn towards the land, took a course about a mile to the north-west of the accepted track over the high ground behind Seaford, but perhaps this was deliberate, for he seemed to have found himself a very convenient valley.

Of the fast brigade, Garnier's Norécrin, easily recognisable by its extreme dihedral, made a beautifully clean turn, as did Count Bonzi in the graceful Ambrosini; and the two Gemini experts, Somers and Dunkerley, in close company, executed the steep, spectacular pylon turns expected of them. Inevitably, for they passed by so long afterwards and their turns were necessarily so wide, the back-marking Hurricane and Spitfire attracted little attention.

Altogether it had been a most stimulating spectacle; and the R.O.C. were not called upon to report a single infringement, for no competitor had turned "inside" the lighthouse.

Before very long, the leaders were coming through to the finish, this time flying a mile or so out to sea on their track from Beachy Head (where most of them had been over 500ft *below* the cliff-top observers!) to the West Pier. Kendall's Chilton was so far ahead of the expected time that some people missed him altogether, and others assumed that it had nothing to do with the race. What seemed to be the contest proper was led at this point (so far as could be seen against the sun) by Hayhow's Aiglet about 200 yards ahead of Cotter's Taylorcraft and Marler's Tiger Moth, and slowly drawing away from them; then there was a gap of a couple of miles before a whole gaggle of aircraft followed, with Christie's Klemm coming quickly through.

The last 18 miles from Newhaven to the finishing post held no worries for Kendall, who thus managed to beat the handicappers by a margin which has not been bettered since Wally Hope's Fox Moth came home 20 minutes ahead of schedule in the King's Cup of 1932. A bevy of mystified handicappers descended on Kendall after he had landed, but having grilled him at length, were apparently satisfied that their slide rules must have slipped.

Hayhow's Aiglet managed to hang on to a diminishing lead from Captain Christie's bubble-canopied Klemm monoplane, which was seen slipping past Cotter's Taylorcraft just after leaving Newhaven. The first woman pilot home, Mrs. Y. M. Grace, flying a Taylorcraft belonging to the Elstree Flying Club, was awarded a special prize of £50. D. G. Cotter, in another of Elstree's Taylorcraft, was also passed on the home stretch by the cream Proctor of the veteran W/C. R. H. McIntosh.

"Incidents" were provided by three of the test-pilot entrants, Messrs. Lawrence, Forbes and Quill, the first-named having to force-land in a small field near Faversham, when an airscrew blade came adrift on his Bombardier-powered Messenger. Ian Forbes also experienced trouble with his Nighthawk, in the form of a burnt-out vacuum pump, and he had to return to his base at Redhill. Geoffrey Quill landed his Spitfire 22 at Tangmere with fuel trouble. The redoubtable Fred Dunkerley also retired from the race, for reasons unknown. The actual finishing order was slightly modified when the R.O.C. reported that C. B. Wilson's Proctor had passed inside a turning point and was therefore disqualified; he would otherwise have taken ninth place.

The magnificent *Daily Express* Trophy, and a cheque for £1,000 were handed to a smiling Hugh Kendall by G/C. the Hon. Max Aitken, D.S.O., D.F.C., on behalf of the *Daily Express*. Fifteen other competitors also received cash prizes ranging from £500 to £10.

The *Daily Express* and the Royal Aero Club—whose officials had worked like Trojans both before and during the race—deserve the warmest congratulation on the determined way in which they had gone ahead with their plans after the initial discouragement.

FINAL RESULTS

Pos.	Start Pos.	H'cap m s	Pilot, Aircraft and Engine	Finished at 1 hr + m	s	Speed m.p.h
1	9	08.20	H. M. Kendall (Chilton D.W.1, Carden Ford)	27	11	129.0
2	18	19.20	T. W. Hayhow (Auster Aiglet, Gipsy Major I)	23	10	135.0
3	16	18.00	Capt. J. H. Christie (Klemm K1 35D, Hirth)	25	07	132.0
4	37	32.05	W/C. R. H. McIntosh (Proctor I, Gipsy Queen II)	11	12	158.0
5	5	04.25	D. G. S. Cotter (Taylorcraft Plus D, Cirrus Minor I)	38	56	113.5
6	2	02.30	G. Marler (Tiger Moth, Gipsy Major I)	40	58	111.5
7	35	31.35	L. C. Marmol (Proctor I, Gipsy Queen II)	12	35	155.0
8	22	21.40	W. P. I. Fillingham (D.H. Moth Minor Coupé, Gipsy Minor I)	22	50	135.5
9	24	22.00	W. P. Bowles (Miles Messenger IIa, Cirrus Major II)	22	31	136.0
10	3	03.30	Mrs. Y. M. Grace (Taylorcraft Plus D, Cirrus Minor I)	42	10	110.0
11	35	31.35	E. Day (Hawk Trainer III, Gipsy Major I)	14	19	151.5
12	21	21.20	Miss E. L. Curtis (Wicko G.M. I, Gipsy Major I)	24	47	132.5
13	15	16.35	E. W. Westbrook (Messenger IVa, Gipsy Major Id)	29	44	125.5
14	1	00.00	Capt. R. E. Gillman (Avro Avian 4M, Gipsy II)	46	20	105.5
15	20	20.00	E. Ross (Hawk Trainer III, Gipsy Major I)	26	21	130.0

Prizes:—"Daily Express" Challenge Trophy and £1,000; 2nd, £500; 3rd, £250. Other cash prizes ranging from £100 for 4th place to £10 for 15th place. Mrs. Y. M. Grace wins £50 for best performance by a woman pilot.

Other placings: 16, R. R. Paine (Hawk Speed Six); 17, W. W. Lyle (Proctor); 18, H. A. Purvis (Proctor); 19, D. J. Bennett (Proctor); 20, H. Wood (Proctor) 21, B. F. Francis (Auster); 22, J. P. Crowther (Proctor); 23, Mrs. J. H. Ashton (Hawk Trainer); 24, J. K. Quill (Spitfire); 25, Mrs. Z. Irwin (Proctor); 26, A. L. Cole (Comper Swift); 27, T. Scott (Proctor); 28, F. Murphy (Hurricane); 29, K. C. Millican (Proctor); 30, G/C. G. F. K. Donaldson (Taylorcraft Plus D); 31, H. J. G. Turner (Hawk Trainer); 32, P. H. A. Hull (Gipsy Moth); 33, L. Clament (Lignel 46); 34, J. T. Basnett (Hawk Trainer); 35, L. Bonzi (Ambrosini S.7); 36, S/L. J. Rush (Falcon Six); 37, A. E. Coltman (Hawk Major); 38, J. N. Somers (Gemini); 39, Dr. D. F. Little (Vega Gull); 40, P/O. M. R. T. Chandler (Hawk Trainer); 41, F. C. Fisher (Miles Monarch); 42, Capt. R. J. Crosfield (Autocrat); 43, H.R.H. Prince Alexander (Proctor); 44, A. S. K. Paine (Proctor); 45, J. G. Garnier (Norécrin); 46, R. G. Pilkington (Auster); 47, D. D. Dempster (Chilton D.W.1); 48, H. E. Scrope (Puss Moth); 49, Mme. Pierre Genin (Whitney Straight); 50, P/O. N. D. Norman (Moth Major); 51, F/L. P. Raymond (Hawk Trainer); 52, S/L. N. Duke (Hawker Tomtit); 53, G. F. Bullen (Hawker Hart); 54, Paul Genin (Beechcraft Bonanza); 55, J. O. Mathews (Tipsy Junior).

Retired: P. G. Lawrence (Messenger), I. A. Forbes (Nighthawk), F. Dunkerley (Gemini). C. B. Wilson (Proctor III) was disqualified for passing inside a turning-point.

Royal Air Force Awards

THE King has been graciously pleased to approve the following appointments and awards for service in Malaya during the period December 1st, 1950, to May, 1951:

C.B.E.—G/C. R. C. Dawkins.

M.B.E.—F/L. D. D. Barber, F/L. G. A. Foss, W/O. H. G. Aviss.

Bar to the D.F.C.—S/L. A. C. Blythe, D.F.C.

D.F.C.—F/L. K. Fry, Capt. R. P. F. Warner, R.A.

D.F.M.—Sgt. A. E. Cover.

B.E.M.—F/S. L. H. Hawkins, Sgt. A. F. Batchelor, Sgt. F. R. Williams, Cpl. G. Forrest.

Mentioned in Despatches for distinguished service:

Act. W/C. M. H. C. France, R.A.F. Regt., S/Ls. W. T. Harrington, O.B.E., J. Harris, D.F.C., E. Johson, R.A.F. Regt., F/Ls. A. B. Downing, M.A., D. F. Dunphy, A. D. Harvey, M.B.E., T. J. Partridge, J. Rothwell, J. F. M. Widmer. F/O. C. S. MacDonald. P/O. D. L. Green. W/Os. F. T. Donovan, H. W. R. Sutton. F/Ss. H. V. Easy, A. T. Summers, B.E.M., N. Tempest, J. W. White. Sgts. R. Benn, A. D. Lucas, C. Teagle. Act. Sgt. P. F. Richards. Cpls. Abdul Samad Bin Haron, R.A.F. Regt., S. P. Anderson, J. E. Gwilliam, J. M. Lynch, J. E. Mason, R. Nicholson, P. K. Noyce, R. P. Walden, A. Watkins.

"Flight" photograph

SKYLIGHT: The sun beams through threatening cloud over Fassberg airfield as a Redland Vampire operating in Exercise Counter Thrust (some impressions of which appear on pages 410-411) departs for a sortie against Blueland positions.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

R.A.F. Appointments

THE Air Ministry announces that A. Cdre. R. Coats is to be A.O.C. No. 62 (Southern) Group, Home Command, *vice* A. V-M. C. A. Stevens, who has become S.A.S.O., Home Command.

The new A.O.C. Record Office is G/C. W. E. V. Richards, who will assume the acting rank of air commodore.

A. V-M. G. H. Mills will become A.O.C. Malaya from next December. From October, A. Cdre. J. G. Hawtrey is to be S.A.S.O., Far East Air Force; he will have the acting rank of air vice-marshal.

No. 605 Celebrate

AT a dinner held at Castle Bromwich on Saturday last, No. 605 (County of Warwick) Squadron, R.Aux.A.F., celebrated the 25th anniversary of its formation. The function was organized by A. Cdre. J. A. C. Wright, A.F.C., who is now the unit's Honorary Air Commodore and was, in 1926, the first commanding officer.

Some 200 past and present members of the squadron attended, including Lord Willoughby de Broke, M.C., A.F.C., the Lord Lieutenant of Warwickshire, a former C.O. A. Cdre. Finlay Crerar, Inspector of the R.Aux.A.F., was also present.

During the course of the evening it was announced that S/L. J. A. Timmis, the present commanding officer, was handing the reins over to F/L. P. M. R. Walton, one of the flight commanders. S/L. Timmis is going to South Africa.

No. 605 won the Esher Trophy no fewer than six times during the first nine years of the squadron's existence. In the war, after taking part in the Battle of Britain, it was sent to the Far East, where it was captured in its entirety. Subsequently it was reformed and became the first night intruder squadron. It now forms part of No. 12 Group, Fighter Command, and is equipped with Vampires.

Britannia Shield Competition

OVER 100 competitors for the Britannia shield were welcomed at Uxbridge last Saturday by the Secretary of State for Air, Mr. Arthur Henderson; they came from six countries.

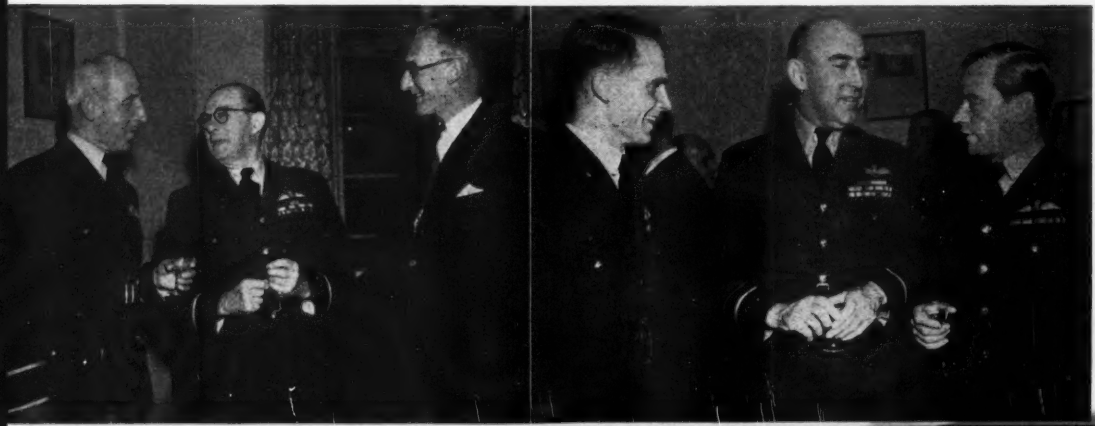
This is the sixth year of the competition. Last year America won with the R.A.F. as runners-up. France had three successive victories—in 1947, 1948 and 1949. Czechoslovakia were the winners in 1946.

R.A.F. Models Championships

THE keynote of the second annual championships of the Royal Air Force Model Aircraft Association, flown at Coningsby on September 1st-2nd, was the co-operation of the weather which, after weeks of almost continuous strong winds, provided conditions that were almost perfect from the aero modeller's point of view.

On the first day the *concours d'elegance* was judged by the station commander, G/C. G. A. Walker, C.B.E., D.S.O., D.F.C., A.D.C., and the Association's chairman, G/C. C. F. Pearce, A.M.I.E.E. The control line, radio control and other classes were then flown, though the entry for the radio category was disappointing in

AT 605's BIRTHDAY PARTY: Left, Lord Willoughby de Broke and Hon. A. Cdre. J. A. C. Wright reminisce with Ald. R. C. Yates, Lord Mayor of Birmingham. Right, the new commanding officer, F/L. Walton (left) with A.V-M. R. L. R. Atcherley, A.O.C. No. 12 Group, Fighter Command, and S/L. Timmis, the retiring C.O.



TROPHY WINNERS: No. 2 Squadron, as reported on this page, has won the Duncan Trophy. Above: The pilots (left to right). Sgt. G. D. C. Clarke, F/O. F. Vindis, D.F.C., F/L. M. E. Townsend, F/L. R. J. W. Motley, F/L. M. J. B. Cole, D.F.C., Sgt. R. G. Rhodes, F/L. L. T. Mersham, F/Sgt. M. Wojciechowski, F/L. C. A. Wade. F L. J. R. Palmer, F/O. F. Wardhaugh, P/O. R. Smith, Sgt. J. W. Tate. Top right: One of the squadron's F.R.9 Meteors, piloted by P/O. Smith. Right: The ground crews.

SERVICE AVIATION . . .

view of the inviting weather conditions. During the afternoon Air Marshal Sir John N. Boothman, C.B., D.F.C., A.F.C., Controller of Supplies (Air), visited the station and watched the flying.

On the following day several classes were flown which attracted large entries, including the Thurston Trophy event for Wakefield-type models of original design. It became apparent at this stage that a marked improvement in the construction and finish of models had taken place during the year and that the stimulus which the Association had given to modelling within the R.A.F. was showing its effect.

During the afternoon a "full-scale" aircraft arrived, bringing Air Chief Marshal Sir Hugh P. Lloyd, K.B.E., C.B., M.C., D.F.C., accompanied by Lady Lloyd. The A.O.C.-in-C. Bomber Command is president of the Association and takes a keen interest in its activities; on this occasion he seemed most impressed by the standard of flying, particularly in the team racing final (Class B) which was an all-out Bomber Command *versus* Fighter Command tussle, F/S. Henshaw, of Bomber Command, eventually winning. After the C.-in-C. had made a speech in which he stressed the far-reaching effects which air power might have upon the future of this country, Lady Lloyd presented the prizes.

The final Command placings showed that Fighter was first, with 139 points, Bomber second (76), Technical Training third (47), and Flying Training fourth (30).

Some remarkable speeds were achieved during the control-line speed contests, the highest figure being 98.4 m.p.h. by the model flown by F/L. Verney (Llandow, Fighter Command).

Winners of the various classes were as follow :—

Concours d'elegance: Flying scale, J/Tech. S. A. Fennel; miscellaneous, F/L. N. W. Verney; solid, Cpl. McHard. *Radio Control*, F/S. R. Saunders. *Team Racing:* Class A, J/Tech. A. Burch; Class B, F/S. A. Henshaw. *Control-line Aerobatics*, L.A/C. P. Smith. *Control-line (Scale) Aerobatics*, J/Tech. A. Burch. *Control-line Speed:* Class 1, F/L. Verney; Class 2, F/S. Gladwin; Class 3, F/L. Verney; Class 4, F/L. Verney. *Free-flying (Scale)*, O/Cdt. M. Staples. *Jetex*, A/C. Dowsett. *Thurston Trophy*, A/C. Dowsett. *Open Rubber Models (Apprentices)*, L. A/App. Luesley. *Open Power*, L.A/C. Posner. *Open Glider*, S. A/C. Randalls. *Open Rubber*, P/O. Twomey.

R.C.A.F. Appointments

IT is announced that G/C. E. A. McNab, O.B.E., D.F.C., C.D., is to be R.C.A.F. Director of Postings and Careers. He succeeds G/C. J. G. Stephenson, O.B.E., A.F.C., who is to attend the next course at the Imperial Defence College in Britain. G/C. McNab commanded the first Canadian fighter squadron to go overseas in the recent war and was the first R.C.A.F. pilot to shoot an enemy aircraft down in the Battle of Britain.

Farms and Gardens Competition

BOSCOMBE DOWN has won the Royal Air Force Farms and Gardens competition for 1951. Cosford, the winner in 1947, was second and Lindholme, winner in both 1948 and 1949, was placed third. In all 158 units took part in the contest.

The total area now under cultivation at R.A.F. stations is 2,578 acres and receipts from the sale of produce last year amounted to £237,825. Boscombe Down cultivates 105 acres and hopes soon to take in a further 88 acres. Over 200 pigs are kept. W/C. J. S. F. Barnard is the "farmer."

PREMIER AWARD: Mrs. C. R. Attlee presenting the Unit Garden Trophy to A. Cdre. A. W. B. McDonald, of Boscombe Down, at the Ninth R.A.F. Fruit and Vegetable Show, held last week.

Duncan Trophy Winners

THE Duncan Trophy, presented to the R.A.F. by Gen. Gervasio Duncan, C.A.S. of the Brazilian Air Force, in 1947, has been won this year by No. 2 Squadron. The trophy is awarded annually to the fighter squadron achieving the best all-weather flying record—calculated on the amount of actual and simulated instrument flying as a percentage of total flying time. Results were very close: the runners-up, No. 72 Squadron, with a figure of 17.40 per cent, were only 0.04 per cent behind the winners.

No. 2 Squadron, commanded by S/L. R. M. Pugh, A.F.C. is a fighter reconnaissance unit serving with 2nd T.A.F. It was the first squadron to be equipped with the Gloster Meteor F.R.9, which is basically similar to the Mk. 8 with the addition of camera ports.

Memorial Service

IN memory of the late W/C. (R) L. A. W. Deane, A.R.Ae.S., of R.A.F. Station Halton, Bucks, a service will be held in the station church, St. Georges, next Sunday, September 30th, at 3.20 p.m. W/C. Deane, who was chairman of the Halton Branch of the R.Ae.S., lost his life in a mountaineering accident. Those wishing to attend are asked to notify F/L. V. H. Searles, Adjutant, No. 2A Wing, R.A.F. Halton, Bucks.

Reunion

NO. 4 Naval Fighter Wing will hold its annual reunion in London on Saturday, November 3rd. Lt. Cdr. G. C. Baldwin, R.N.A.S. Ford, Arundel, Sussex, has the arrangements in hand.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

"Zura's" Cartwheel

I WAS one of the many spellbound spectators at this year's S.B.A.C. Display who saw Zurakowski's magnificent demonstration of the "cartwheel," and I was intrigued to hear the commentator describe it as the only completely new aerobatic manœuvre for twenty years. As far as I can recollect, however, I saw an almost identical manœuvre on several occasions in February-March, 1941, when I was on a fitters' course at Innsworth Lane, near Gloucester.

The machine concerned was, on each occasion, a Hurricane, presumably built by Glosters at Hucclecote and flown by one of their test pilots (unless it came from Rotol's airfield, nearby).

The "rotation" came at the top of a much less steep and prolonged climb than the Meteor's, but, looking back on it, I cannot see where the pilot got sufficient turning moment unless, in the last stage, he opened the throttle wide and gave full rudder.

Can any other reader confirm this 10½-year-old memory, and, if possible, identify the pilot and tell me how it was done?

Tolworth, Surrey. T. N. SIMPSON.

[An explanation of the cartwheel appeared last week (page 383). Such a manœuvre is not possible with a single-engined aircraft like the Hurricane, and "Zura" himself suggests that the evolution witnessed by Mr. Simpson was more akin to a flick roll.—ED.]

Farnborough Bouquets and Brickbats

CONGRATULATIONS to the organizers of the 1951 S.B.A.C. display at Farnborough. And to:—

Charles Gardner for his effortless commentary on the flying events on the two public days.

Jan Zurakowski for proving the seemingly impossible a fact.

The test pilots for their usual polished performances with ever faster and greater British aircraft.

To everyone concerned with the flying, congratulations. But howls of derision to:—

Those responsible for the complete lack of organization on the roads leading to Farnborough—for not having planned in advance the reception of some 150,000 people, even more so in view of the favourable weather forecast given on Saturday the 15th. A five-minute talk by a competent traffic authority after, say, the 9 o'clock news would have worked wonders. Howls, too, for their failure to divert or withhold British Road Service "heavies" carrying oil storage tanks by these routes at the peak period.

London, S.W.13. D. R. STANLEY-ADAMS.

MAY I, through the medium of your journal, make a very strong criticism of the organization of this year's Farnborough Air Display?

Never have I come across such gross inefficiency in traffic and parking arrangements. We arrived within five miles of Farnborough at 2.30 p.m. and reached the car park at 4.45 p.m. in time to see the tail end of the display—and this after having been charged £1 for two of us in a two-seater. While one feels charitable on a day such as this, the disorganization makes this fee no less than impudence.

I am composing this letter, sitting waiting my turn to leave the car park. It is now 9.50 p.m. and no sign of movement ahead.

London, S.W.5. PETER J. MORLEY.

ALREADY some criticisms of the poor arrangements to admit the public to the Farnborough Show have appeared in the Press, but no mention has been made of the complete lack of any arrangements to permit their egress.

No gates were opened at the South Entrance and most of the 140,000 crowd were apparently expected to pass back through turnstiles which good-humouredly refused to turn. This quite naturally caused a terrific jam; people were forced to clamber over them as best they could. It took this correspondent from 5.30 to 6 p.m. to move the hundred yards or so through the turnstiles. Just to improve matters, it rained steadily.

No football match was ever like this, because of the presence of so many young children, and were it not for the good-natured helpfulness of the crowd many nasty incidents could easily have occurred.

Having successfully emerged we thought our troubles over. It was, however, a mere beginning for the many of us who had been beguiled by a wide-awake publicly-owned railway into buying combined rail-and-bus tickets from Waterloo to the airfield. A mile-long queue for the return bus journey to Aldershot station confronted us, and a route-march up muddy lanes with grea potholes full of rainwater to reach the end of it. Please do not think I exaggerate; all this is true in word and fact.

But the queue moved steadily forward. At least, it did for two hours and then—stop. We waited and waited, and then intelligence passed on the message, true or untrue I know not, that Aldershot station was bearing down under the stress of people upon its planks and was likely to collapse at any moment; thereupon, they said, officialdom had decided to take no more from the Farnborough queue until a few had been drained off at the Aldershot end. This was sufficient for the writer, who immediately left the queue and found alternative travel.

The immense queue I left behind was mainly composed of families with small children who were soaked and utterly miserable—crying with cold. Lord knows what time they got home.

This latter complaint is no pigeon of the airfield authorities and concerns only the publicly-owned British Railways.

Sidcup, Kent. H.B.

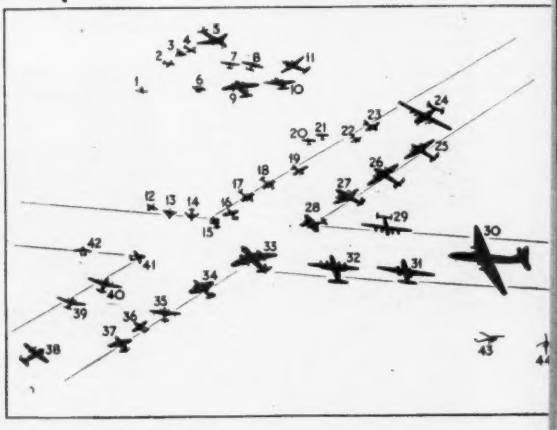
[In a letter to *The Times* on September 21st Mr. E. C. Bowyer, director of the S.B.A.C., said, *inter alia*, that the Sunday evening's delays were due to the fact that the heavy rain, which began to fall immediately flying ended, caused a concerted homeward rush. (Otherwise, probably, visits to the "static" exhibits would have smoothed the flow.)—Ed.]

TO the general impression gathered from the many I have spoken to who visited it, that the 1951 S.B.A.C. Display at Farnborough was the finest yet, I should like to add the suggestion that this was due in *some* measure to Mr. Charles Gardner's brilliant commentary during the public days. For informative yet not-too-technical, wit-sprinkled and light-hearted yet sincere digests on aviation he has no rivals.

Reigate, Surrey. V. H. IZARD.

WHAT THEY ARE : This is the key to the Farnborough aerial photograph published on page 422. The respective aircraft are :—

(1) De Havilland Chipmunk.
(2) Vickers-Supermarine Attacker.
(3) Avro 707A.
(4) Hawker P.1072.
(5) De Havilland Comet.
(6) Sapphire-Meteor.
(7) Percival Prince.
(8) Handley Page (Reading) Marathon.
(9) Bristol 170.
(10) Vickers-Armstrongs Varsity.
(11) Airspeed Ambassador.
(12) Boulton Paul P.111.
(13) Avro 707B.
(14) Hawker P.1052 (Naval).
(15) Fairey Gannet (wings folded).
(16) Fairey Firefly 7.
(17) Gloster P.V. Meteor.
(18) Gloster Meteor N.F.11.
(19) Scottish Aviation Pioneer.
(20) Auster Model "S".
(21) Auster Aiglet.
(22) Percival Provost.
(23) Percival Sea Prince.
(24) Blackburn and General Aircraft G.A.L. 60.
(25) Proteus-Lincoln.
(26) Nomad-Lincoln.
(27) Vickers-Armstrongs Viscount.
(28) English Electric Canberra B.5.
(29) Avro Shackleton.
(30) Bristol Brabazon I.
(31) Avro Ashton.
(32) Handley Page Hermes V.
(33) Short S.A./4.
(34) English Electric Sapphire-Canberra.
(35) Short Sealand.
(36) De Havilland Vampire Trainer.
(37) Westland Wyvern T.F.4.
(38) Handley Page (Reading) Mamba-Marathon.
(39) De Havilland Dove.
(40) De Havilland Heron.
(41) De Havilland Sea Venom N.F.20.
(42) De Havilland Reheat Venom.
(43) Bristol Sycamore.
(44) Westland-Sikorsky S.51.



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G. A. WHEATLEY,
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APPLICATIONS, giving full particulars of experience and qualifications and containing the names and addresses of not more than three referees, should be forwarded to the Registrar, The College of Aeronautics, Cranfield, Bletchley, Bucks, the envelope marked "Demonstrator, Aircraft Propulsion." Further particulars will be supplied on application. Closing date for the receipt of applications is October 27th, 1951. [6983

YOUNG engineer requiri ed take charge small workshop, preferably with experience hydraulics valves and with initiative. Box 4222. [6983

BROOKLANDS AVIATION, Ltd., have vacancies for airframe and engine fitters, electricians for servicing and repair of R.A.F. aircraft. Good wages and piecework bonus.

APPLY: No. 4 Site, Sywell, Northants. [0308

JIG and tool draughtsman required, fully experienced. —Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds, stating age, experience and salary required. [0363

CHIEF engineer wanted take charge thriving gas turbine department of large company having urgent important development and production work in hand.—Write, in first case, Box 4092. [6952

DESIGNERS and senior and junior draughtsmen for work on gas turbine engines. Midland area. Experience not essential but an advantage. Apply to Armstrong Siddeley Motors, Coventry. [0316

WANTED, flight engineers for York aircraft. "A" and "C" to cover York aircraft essential.—Apply A. Chief Engineer, Eagle Aviation, Ltd., Luton Airport, Luton, Beds. [0310

SENIOR jig and tool draughtsman wanted.—Apply, giving details of experience and qualifications to Personnel Officer, Westland Aircraft, Ltd., Yeovil, Somerset. [6990

TECHNICAL Assistant required by a firm in Kent. Aircraft experience essential and preferably some knowledge of aerodynamics. Living accommodation available. —Box 4200. [6972

CHIEF jig and tool designer with experience in production development engineering for complete aircraft.—Apply in first instance with particulars of qualifications, experience, age, and salary required, to Box 4244. [6960

RESIDENT lady secretary-book-keeper, age 25-30. Shorthand typing. Double entry essential. Board, commmodation plus £4½.—Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorkshire. [6968

JIG and tool draughtsmen required. Previous aircraft experience not essential. Pension and life assurance scheme.—Apply: Employment Manager, Vickers-Armstrongs (Aircraft Section), Weybridge. [6966

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.

APPLICATIONS should state full particulars of experience and qualifications and should be addressed to The Personnel Manager, The de Havilland Engine Co., Ltd., Stonegrove, Edgware, Middx. [0575

SCHEDULE clerk required (male) with experience in compiling M.o.S. spares schedules.—Applications, in writing, stating age, experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., The Airport, Luton, Beds. [0596

TECHNICAL authors and illustrators required. Knowledge of M.o.S. procedure desirable.—Applications in writing, stating age, experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds. [0594

WANTED, research engineer, knowledge of rubber technology, electronics and aircraft fuel systems an advantage. Apply, stating experience, salary, etc., Fireproof Tanks, Ltd., The Airport, Portsmouth. Tel.: Portsmouth 2367/8.

MECHANICAL, structural or general engineering draughtsmen wanted for aircraft work. Previous aircraft experience not essential. Pension and life assurance scheme.—Apply, Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge. [6920

URGENTLY required for high-class precision work, instrument fitters, assembly fitters used to fine limits, universal millers and capstan setter operators.—Apply, giving full details of experience, etc., to Personnel Officer, Normalair Ltd., Yeovil, Somerset. [6953

GLOSTER AIRCRAFT Co., Ltd., have vacancies for fully experienced aircraft structural and electrical draughtsmen.—Applications, in writing, stating age, experience and salary required, to Employment Officer, G.A.C., Ltd., Hucclecote, Glos. [0910

PLANNING engineers for gas turbine assembly and test required. Good salaries and prospects for suitable applicants. 5-day 39-hour week. Superannuation scheme. —Apply, giving details of previous experience and salary required, to Box 3917. [6906

TECHNICAL author required to prepare service manuals and instructions book for aeroplane landing gear and hydraulic equipment. Youth of course and inexperience not a disadvantage if compensated by interest and ability to write reasonable prose.

WRITE personally, stating age, experience and salary required, to Mr. A. R. Smith, Chief Personnel Department, British Messier, Ltd., Cheltenham Road East, Gloucester. [6935

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [0420

THE Supermarine Works of Vickers-Armstrongs, Ltd., have vacancies for mechanical and structural engineering draughtsmen with aircraft experience preferred but not essential. Write, giving full details of experience and salary required, to Personnel Officer, Vickers-Armstrongs, Ltd., Hursley Park, nr. Winchester. [0086

ONE technical writer and one technical artist for small technical publications section being formed. Previous experience on similar type of work on aircraft or aircraft engines desirable with good engineering background.—Apply, giving details of age, experience and salary required, etc., to Box 4233, quoting ref. B.9. [6987

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AIRCRAFT fitter assemblers required by de Havilland Aircraft Co., Hatfield, offering good working conditions, modern equipment, opportunities for advancement, Superannuation scheme, sports club, etc. Apply by telephone: Hatfield 2345, in person, or by letter addressed to Personnel Manager. [0930

TECHNICAL author required for description of aircraft hydraulic equipment for Ministry of Supply and Air Registration Board handbooks; and for technical publicity. Good general education and experience of similar work.—Apply, Personnel Manager, Electro-Hydraulics, Ltd., Warrington, Lancs. [6950

DRAUGHTSMEN. Vacancies exist for two section leader draughtsmen with experience in airframe design, for work on new and interesting projects, those experienced in design of gas valves for use at low temperature would be desirable but not essential. Midland Area.—Box 4153. [6967

ENGLISH ELECTRIC have vacancies in their London design office for aircraft stressmen. Suitably qualified men, having structural stressing experience, should write giving full details and quoting ref. 603A, to Central Personnel Services, The English Elec., the English Electric Co., Ltd., 24-30, Gillingham Street, London, S.W.1. [6964

ENGLISH ELECTRIC invites applications from suitably experienced draughtsmen for aircraft work at Warton or in London. Men interested in these permanent positions should write, quoting ref. 120F, to Central Personnel Services, English Electric Co., Ltd., 24-30, Gillingham Street, London, S.W.1. [6963

ADMINISTRATIVE vacancy. Sales, home and export and general administration. Applications are invited by old established manufacturers (East Midlands) of specialist aircraft equipment from men, preferably about 35 years of age, who have had a sound business training. Write Box 4218. [6979

PRESS tool designers are required by large engineering company in the Southampton area. Applications are invited from men with the necessary tool-room and draughting experience. High salary and good prospects for men with required ability.—Write Box 1874, A. K. Advg., 212a, Shaftesbury Avenue, W.C.2. [6945

PLANNING engineers (aircraft) required. Considerable production planning experience and sound knowledge of metal airframe components manufacture essential.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds., stating age, experience and salary required. [6935

DEVELOPMENT engineers are required in London to work on aero and marine engines. Candidates must possess a degree or A.M.I.Mech.E. An attractive salary will be paid to suitably qualified men.—Write, stating age, experience and approximate salary, and mentioning Ref. H.G.C., to Box 4008. [6921

THERE are still some vacancies for senior aerodynamicists, and senior and junior stressmen in the Saunders-Roe design organization. Men of suitable ability and qualifications are invited to apply, stating experience, qualifications, age and salary expected, to the Personnel Officer, East Cowes, I.O.W. [6987

TECHNICAL assistants required, experience of aero engine development testing and reporting an advantage, 5-day week, good canteen facilities.—Please write giving age and full details of previous experience, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edware, Middlesex. [6926

A. S.T. requires a ground instructor in connection with Ab Initio Service Flying Training, at Ansty, nr. Coventry. Applicants should be ex-pilots and should have sufficient knowledge of aero engines to be able to give elementary instruction. Apply in the first instance, to the Commandant, Air Service Training, Ltd., Hamble, Hants. [6979

DRAUGHTSMEN. Vacancies exist for first-class men in the jig and tool and design departments. Those with aircraft experience preferred but others with good mechanical and structural knowledge welcomed. Good shared board accommodation available. — Apply, in writing, or in person to the Labour Manager, Fairey Aviation Co., Ltd., Great Chapel, Stockport. [6970

TECHNICAL Assistants required in the mechanical engineering department on work in connection with the development of gas turbine engines. Vacancies exist for junior and senior assistants in men working with vibration, static structure testing and gear and bearing research. Apply Armstrong Siddeley Motors, Ltd., Coventry. [6972

DRAUGHTSMEN with experience in high-quality light mechanical or hydraulic engineering are required by progressive Midland manufacturing company. Positions with good prospects are available to younger men. Salaries will be in accordance with age, qualifications and experience.—State details together with salary required to Box 4093. [6956

FLYING instructors will shortly be required for a proposed basic flying training school at Sywell. Applicants must have held a C.F.S. Category and be on the R.A.F. Reserve, or be prepared to join. Applications, stating age, qualifications and details of experience, should be made in writing to the Manager, Brooklands Aviation, Ltd., Sywell Aerodrome, Northants. [6936

BLACKBURN AND GENERAL AIRCRAFT, Ltd., have vacancies for assistants in their instrument laboratory for instrument calibration and repair work. Experience of this class of work and of R.A.F. instruments is desirable, although not essential. Applications, giving particulars of age, training, experience, etc., to the Personnel Manager, Brough, E. Yorks. [6926

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd. Applications are invited from senior and junior draughtsmen, and stressmen, for work on this interesting programme. Write, giving details of experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Luton, Beds. [0095

THE GLOSTER AIRCRAFT Co. requires senior and intermediate stressmen to work on designs and projects of advanced interest. Excellent prospects of advancement for sound and energetic men. Apply, in first instance, giving full particulars of technical qualifications, age, experience and salary required, to The Chief Designer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [6941

HANDLEY PAGE, Ltd., have vacancies for senior and junior technical assistants in their mechanical and structural test departments at Cricklewood and Radlett. Qualifications should include a degree or Higher National Certificate. Previous experience is desirable but not essential. Write, stating age, qualifications and details of experience, to Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2. [6736

SITUATIONS VACANT

SENIOR planning engineers wanted. Applicants must have served an apprenticeship and have had experience with component breakdown and detail processing as planning engineers. The company operates a superannuation and life assurance scheme.—Applications in writing, stating age, experience and salary required, should be addressed to the Personnel Manager, Folland Aircraft, Ltd., Hamble, Southampton. [6966]

APPLICATIONS are invited for the responsible position of flight engineer for guided missiles. Applicant should be of degree standard and have practical experience of mechanical and electrical installations. Knowledge of telemetry and servo mechanisms is desirable, though not essential. North London district.—Write full details, qualifications, experience, age, salary sought, to Box A.C.65690, Samson Clarks, 57-61, Mortimer Street, W.1. [6930]

THE Supermarine Works of Vickers-Armstrongs, Ltd., have vacancies for draughtsmen for component and installation work on radio, electrical, electronic and instrument installations in aircraft. Practical and D.O. experience desirable but not essential. Write, giving full details of experience and salary required, to Personnel Officer, Vickers-Armstrongs, Ltd., Hursley Park, nr. Winchester. [6365]

SENIOR design draughtsmen and detail draughtsmen required to assist in the conversion of aircraft for a wide variety of experimental work and other defence projects of advanced interest. Only keen intelligent men with a flexible outlook on experimental design work need apply. Preference will be given to candidate with ordinary or Higher Nat. Cert. qualifications. Location, Bedfordshire.—Write, stating experience, qualifications, age and salary required, to Box 4234, quoting ref. A.12. [6988]

JIG and tool draughtsman required for aircraft and automobile accessory work. Good technical training essential combined with thorough practical experience in toolroom, production shops and in jig and tool drawing office. Excellent opportunity for young man of ability. Assistance given in obtaining accommodation.—Write, stating age, qualifications, experience and salary, to Personnel Officer, Lockheed Hydraulic Brake Co., Ltd., Leamington Spa. [6955]

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THE GLOSTER AIRCRAFT Co. requires the services of a number of aerodynamicists. (a) for design and project work, and (b) for flight test reduction. Opportunity exists for individuals to vary their experience within the Aerodynamics Department. Candidates with some years' experience preferred, but applications from juniors with sound mathematical ability will receive full consideration. —Apply, in the first instance, giving full particulars of age, experience and salary required, to The Chief Designer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [6913]

SERVICE engineers, experienced, required. Good knowledge of all maintenance and overhaul of gas turbine engines essential. Opportunities of overseas travel exist for applicants having required technical background, education and experience. Also required, technical assistants, aged 24 and upwards, for Service Department duties. Must be able to deal with correspondence, compile technical records, etc., without supervision. Apply, the Personnel Officer, the de Havilland Engine Co., Ltd., Leavesden Aerodrome, nr. Watford, Herts. [6576]

SENIOR technician (female) required to take charge of small computing section operating electrical calculators, carrying out calculations for an aircraft design technical office. Applicants should have a knowledge of applied mathematics to, at least, engineering degree work; and ability to supervise. Salary according to experience and qualifications.—Applications should be addressed to: The Personnel Officer, Bristol Aeroplane Co., Ltd. (Aircraft Division), Filton House, Bristol. [6911]

NORMALAIR, Ltd., invite applications from designers and draughtsmen for work in their Yeovil office, in connection with aircraft air conditioning, pressurising and high-altitude breathing equipment. Experience of aircraft equipment or delicate precision mechanisms is essential, only first-class qualified men need apply.—Applications, stating age, experience, qualifications, and salary required should, in the first instance, be addressed to the Personnel Officer, Normalair, Ltd., Yeovil, Somerset. [6954]

(a) Flight engineer required for aero-engine test work. (b) Technical assistant for employment in flight-test office on flight performance analysis of aero engines and installations. Must have reached Higher National Certificate standard in appropriate subjects and preferably with society fellowship of Aeronautical Society. Experience as technical flight observer essential. (c) Junior technical assistant for employment on technical flight observer duties and aero engine and installation flight department work. Preferably if achieved Higher National Certificate standard. Some previous flight experience desirable. Location: Bedfordshire.—Write, giving details of age, experience and salary required, to Box 4096, quoting Ref. E.8. [6937]

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TECHNICAL sales representative required by manufacturers of established products used extensively in aircraft and commercial (sheet metal) engineering industries. Applicant must possess sound aircraft and/or commercial engineering background, both practical and academic, to enable him after training to sell to technicians and designers. Experience with light alloys an advantage. Good education, personality and selling ability are also essential qualifications. Must reside in Glasgow area to cover industrial Scotland and North East England territories. Salary £500-£600 p.a. plus commission and expenses. Pension scheme. Full relevant details in strictest confidence to Box 3023. [6980]

BRITISH EUROPEAN AIRWAYS have vacancies for pilots, with at least a commercial pilot's licence. (a) Pilots aged under 35 for a normal engagement, which includes membership of the pension scheme. Commencing salary between £815-£95 p.a., according to qualifications and experience. (b) Pilots aged 35 and over for a temporary appointment of two years, with the possibility of extension. Commencing salary between £815-£1,305 p.a., according to qualifications and experience. Such pilots will not be eligible for the pension scheme, but will receive a gratuity of £300 for each year of service on expiry of appointment.—Requests for application form by postcard to Personnel Officer, Flight Operations Department, B.E.A., Ruislip, Middlesex. [6900]

BRITISH EUROPEAN AIRWAYS is seeking to build up a staff of good tradesmen, men who are looking for steady employment with good rates of pay and conditions. Immediate vacancies exist for airframe and engine fitters, electricians, radio mechanics, instrument mechanics and sheet metal workers. Hourly basic rates for these trades are 2/10 plus up to 3d. proficiency pay plus payments by results bonus averaging about 9/- per week for a 44-hour week. In addition, shift premium payments ranging from about 1/- to 2/- for a 44-hour week are payable where appropriate. There are excellent pension and insurance and sick pay schemes; 2 weeks' paid holidays a year; free air travel concessions, etc. Apply for further particulars to the Personnel Officer, B.E.A., Northolt Base, Ruislip, Middlesex (Ruislip 6061 or Waldow 4311), nearest station Ruislip Gardens, Central Line. [6914]

(a) Assistant structural test engineer to take charge of structural test laboratory, ordering and maintenance of testing equipment, and material, manufacture of test rigs. Must have some years, practical experience of aircraft structure testing and be capable of taking some administrative responsibility. Higher National standard in engineering. Salary according to experience and qualifications. Assistance with accommodation can probably be arranged for suitable applicant. (b) Technical assistant for material test laboratory to take charge of material testing in accordance with British Standard specifications. (c) Stress analyst, degree standard, to analyse strain gauge test results for comparison of calculated stresses with actual stress distributions. Location: Bedfordshire.—Apply, giving full particulars of age, experience and salary required, to Box 4047, quoting Ref. B.8. [6938]

AERONAUTICAL and mechanical engineers are invited by the Ministry of Supply to apply for appointments in the experimental officer class, mainly in the aerodynamics and structures departments at the Royal Aircraft Establishment, South Farnborough, Hants. Candidates should possess a Higher National Certificate or equivalent qualification in aeronautical or mechanical engineering but higher qualifications, e.g., a degree in engineering would be an advantage. Experience in experimental work, preferably in connection with aircraft design or testing, is desirable. Salary will be assessed according to age, qualifications and experience within the ranges: Senior experimental officer (minimum age 35), £742 to £960; experimental officer (minimum age 28), £545 to £695; assistant experimental officer, £360 (at age 18) to £505. Rates for women somewhat lower. The posts are unestablished.—Application forms obtainable from Ministry of Labour and National Service, Technical and Scientific Register (K), York House, Kingsway, W.C.2, quoting C.572/51A. Closing date October 20th, 1951. [6969]

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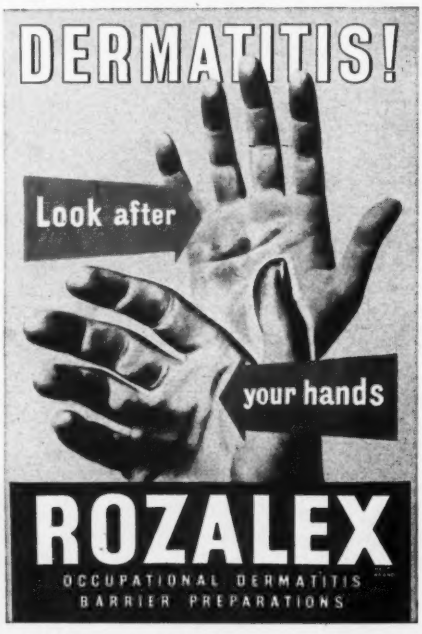

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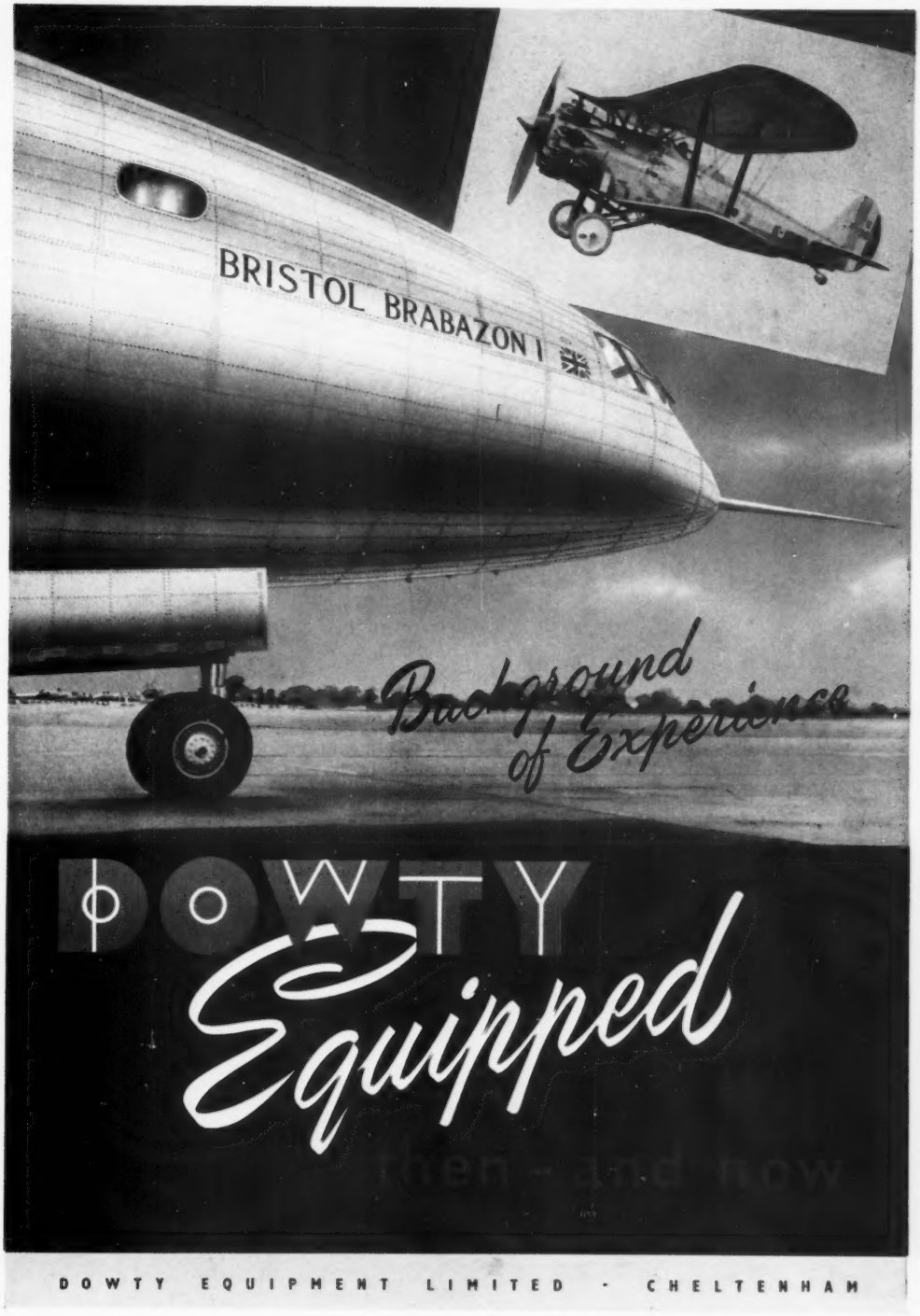
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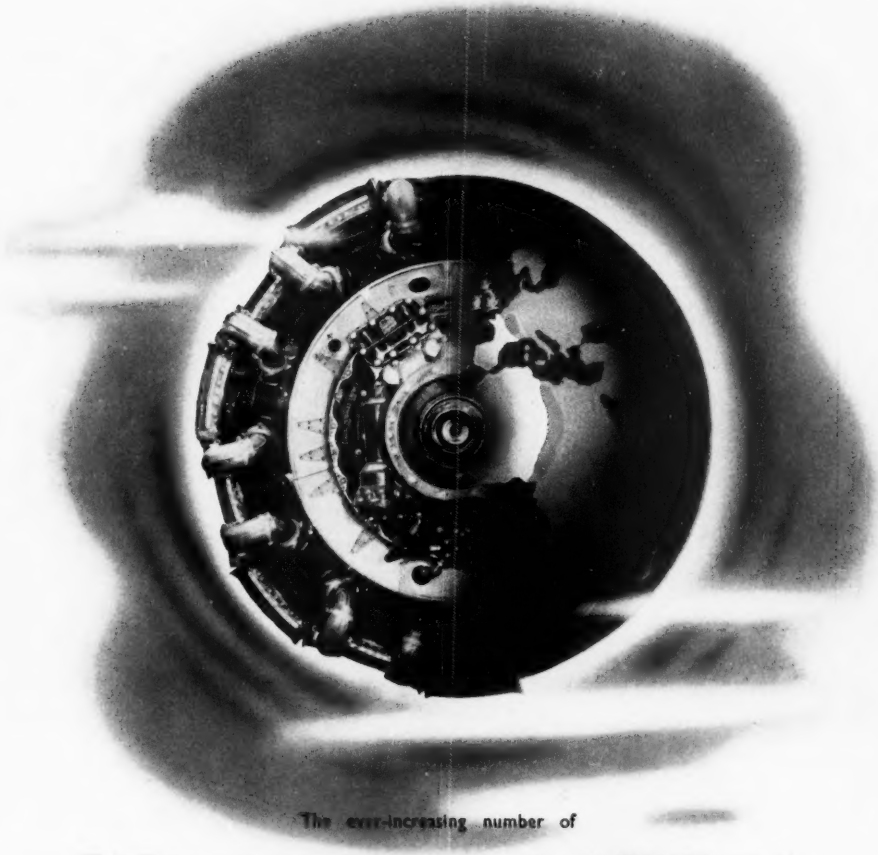

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